Notice of Determination

Appendix D

To:

☒ Office of Planning and Research

For U.S. Mail: P.O. Box 3044, Sacramento, CA 95812-3044

Street Address: 1400 Tenth St., Sacramento, CA 95814

☒ County Clerk

County of: Marin

Address: 3501 Civic Center Drive Room #247, San Rafael, CA 94903

From:

Public Agency: Marin Resource Conservation District

Address: P.O. Box 1146 / 145 A Street, Pt. Reyes Station, CA 94956

Contact: Nancy Scolari, Executive Director

Phone: 415-663-1170

Lead Agency (if different from above):

Address:

Contact:

Phone:

FILED
NOV 22 2010
MICHAEL J. SMITH
MARIN COUNTY CLERK
BY: J. Whitney, Deputy

SUBJECT: Filing of Notice of Determination in compliance with Section 21108 or 21152 of the Public Resources Code.

State Clearinghouse Number (if submitted to State Clearinghouse): 2004052008

Project Title: Marin Coastal Watersheds Permit Coordination Program

Project Location (include county): western Marin County

Project Description:

Renewal of the Marin Coastal Watersheds Permit Coordination Program (PCP) for use of 17 conservation and restoration practices to address environmental quality and agricultural sustainability in coastal Marin County.

This is to advise that the Marin Resource Conservation District ☒ Lead Agency or ☐ Responsible Agency has approved the above described project on November 10, 2010 (Date) and has made the following determinations regarding the above described project:

1. The project [☐ will ☒ will not] have a significant effect on the environment.
2. ☐ An Environmental Impact Report was prepared for this project pursuant to the provisions of CEQA.
   ☒ A Negative Declaration was prepared for this project pursuant to the provisions of CEQA.
3. Mitigation measures [☒ were ☐ were not] made a condition of the approval of the project.
4. A mitigation reporting or monitoring plan [☐ was ☒ was not] adopted for this project.
5. A statement of Overriding Considerations [☐ was ☒ was not] adopted for this project.
6. Findings [☒ were ☐ were not] made pursuant to the provisions of CEQA.

This is to certify that the final EIR with comments and responses and record of project approval, or the negative Declaration, is available to the General Public at: Offices of the Marin County Clerk and of the Marin Resource Conservation District

Signature (Public Agency) Nancy Scolari by [illegible] Title Executive Director

Date November 15, 2010 Date Received for filing at OPR

Authority cited: Sections 21083, Public Resources Code.
Reference Section 21000-21174, Public Resources Code.

Revised 2005

MARIN RESOURCE CONSERVATION DISTRICT

INITIAL STUDY

AND

MITIGATED NEGATIVE DECLARATION

FOR

MARIN COASTAL WATERSHEDS PERMIT COORDINATION PROGRAM

November 2010

Prepared for:

Marin Resource Conservation District
Post Office Box 1146
Point Reyes Station, CA 94956
(415) 663-1170

Prepared by:

Prunuske Chatham, Inc.
400 Morris Street, Suite G
Sebastopol, CA 95472
(707) 824-4600

This Report Has Been Prepared Pursuant To The
California Environmental Quality Act of 1970
State of California

TABLE OF CONTENTS

Page

Initial Study and Draft Mitigated Negative Declaration 1
Environmental Factors Potentially Affected 2
Determination 3
Overview: Marin Coastal Watersheds Permit Coordination Program 4
Background 4
Program Partners 4
Need for Program 6
Existing Conditions 7
Topography and Geographic Scope 7
Areas not Included in the Program 7
Figure 1. Map of Program Boundary 8
Descriptions of Natural Watercourses 9
Existing Land Uses 10
Program Description 11
General Description of Proposed Action 11
Conservation and Restoration Practices Included in the Program 12
Table 1: Conservation and Restoration Practices Included in the Program 12
Limitations on Project Size 18
Table 2: Maximum Grading Dimensions & Volumes Associated with Implementation of Practices 18
Actions not Included in the Program 19
Project Selection Process and Impact Assessment 20
Technical Advisory Committee 20
Project Selection Criteria 20
Individual Project Background Scoping and Impacts Assessment 20
Regulatory Agency and Public Review of Individual Projects 21
Description of Programmatic Permitting Mechanisms 21
Planning and Permitting Mechanisms for Individual Projects 22
Individual Project Notification to Regulators 22
Procedures for Complying with Permit Conditions and to Address Noncompliance 23
Environmental Protection and Mitigation Measures 23
Conditions to Avoid or Minimize Adverse Impacts 24
1. Program Design Specifications (DS) 24
2. Temporal Limitations on Construction (TL) 25
3. Requirements for Construction Site Management (CS) 26
4. Requirements for Erosion Control (EC) 27

Page

5. Limitations on Construction Equipment (CE) ... 29
6. Limitations on Earthmoving (EM) ... 29
7. Limitations on Use of Rock and Other Hard Structures (RU) ... 30
8. Limitations on Vegetation Removal and Replanting Requirements (VE) ... 31
9. Limitations on Use of Pesticides, Herbicides, and Fertilizers (PH) ... 33
10. Limitations on Work in Streams and Permanently Ponded Areas (SP) ... 34
11. Specific Requirements for Protection of Listed Species (LS) ... 34
Monitoring and Reporting Program ... 35
Pre- and During Construction Monitoring, Notification, and Reporting ... 36
Post-construction Monitoring, Notification, and Reporting ... 36
Qualitative Monitoring ... 36
Quantitative Effectiveness and Validation Monitoring ... 37
Monitoring Report Requirements ... 37
Initial Study Checklist ... 39
Aesthetics ... 39
Agriculture and Forest Resources ... 40
Air Quality ... 42
Table 3. Existing Air Quality ... 43
Biological Resources ... 45
Table 4: Special-status Species with Potential to Occur in the Marin Coastal Watersheds Program Area ... 47
Life History and Habitat Needs of Listed Species Known to Occur in the Action Area ... 56
Potential Impacts on Special-status Species and Program Impact Avoidance Measures ... 58
Cultural Resources ... 65
Geology and Soils ... 66
Greenhouse Gas Emissions ... 69
Hazards and Hazardous Materials ... 71
Hydrology and Water Quality ... 75
Land Use and Planning ... 80
Mineral Resources ... 81
Noise ... 81
Population and Housing ... 83
Public Services ... 84
Recreation ... 85
Transportation and Traffic ... 86
Utilities and Service Systems ... 88
Mandatory Findings of Significance ... 90
References ... 92
Acronyms Used in this Document ... 94

APPENDICES

Appendix 1: Riparian Zone Management Plan

Appendix 2: Project-specific CEQA Compliance Checklist

Appendix 3: Applicable U.S. Army Corps of Engineers Nationwide Permits

NWP 13 (Bank Stabilization)

NWP 27 (Aquatic Habitat Restoration, Establishment, and Enhancement Activities)

NWP 33 (Temporary Construction, Access and Dewatering)

INITIAL STUDY AND DRAFT MITIGATED NEGATIVE DECLARATION

1. Project title: Marin Coastal Watersheds Permit Coordination Program

2. Lead agency name and address:

   Marin Resource Conservation District
   P.O. Box 1146
   Pt. Reyes Station, California 94956

3. Contact person and phone number: Nancy Scolari 415-663-1170

4. Program location:

   Stemple, Walker, and Lagunitas Creek watersheds, the Marin County portions of the Estero Americano watershed, and smaller, unnamed watersheds leading directly to Tomales Bay and the Pacific Ocean, including lands on the Point Reyes Peninsula, Marin County; see also Figure 1 and Areas not Included in the Program Description section below.

5. Program sponsors' names and addresses:

   Marin Resource Conservation District
   P.O. Box 1146
   Pt. Reyes Station, CA 94956

6. General plan designation: Numerous

7. Zoning: Numerous

8. Description of project:

   The program provides coordinated regulatory review for implementation of 17 specific conservation and restoration practices that are intended to reduce erosion and enhance aquatic and terrestrial habitat in the Marin County coastal watersheds. See detailed Program Description and Environmental Protection and Mitigation Measures below. The Initial Study Checklist follows.

9. Surrounding land uses and setting:

   Land uses in the project area include state and national parks, agriculture (grazing, dairy, cropland, and vineyards), and rural private property encompassing both grasslands and mixed hardwood forests and woodlands.

10. Other public agencies whose approval may be required (e.g., permits, funding, or participation agreement.)

California Department of Fish and Game
NOAA Fisheries Service
U.S. Fish and Wildlife Service
U.S. Army Corps of Engineers
San Francisco Bay RWQCB
North Coast RWQCB
California Coastal Commission
State Historic Preservation Office
County of Marin
State Coastal Conservancy
National Park Service

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED

The environmental factors checked below would be potentially affected by this program, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

☐	Aesthetics	☐	Agriculture and Forestry	☐	Air Quality
☐	Biological Resources	☐	Cultural Resources	☐	Geology/Soils
☐	Greenhouse Gas Emissions	☐	Hazards and Hazardous Materials	☐	Hydrology/Water Quality
☐	Land Use/Planning	☐	Mineral Resources	☐	Noise
☐	Population/Housing	☐	Public Services	☐	Recreation
☐	Transportation/Traffic	☐	Utilities/Service Systems	☐	Mandatory Findings of Significance

DETERMINATION

The Marin Resource Conservation District (Marin RCD) has determined that the Marin Coastal Watersheds Permit Coordination Program (PCP) will not have a significant effect on the environment. The Marin RCD identified potentially significant impacts on biological resources, geology and soils, hazards and hazardous materials, hydrology and water quality, and mandatory findings of significance. The program is described in the Initial Study herein, which discusses these potential impacts and the measures to be incorporated into the program to avoid or reduce any potential impacts on resources to a less-than-significant level. The evidence supporting this determination is drawn from information provided by regulatory agencies, including the California Department of Fish & Game, San Francisco Bay Regional Water Quality Control Board, U.S. Army Corps of Engineers, NOAA Fisheries Service, and the U.S. Fish & Wildlife Service, and from the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) Field Office Technical Guide Practice Standards and Specifications (FOTG), the NRCS National Engineering Handbook, and the Engineering Field Manual. Each practice has been developed and field-tested over the past 75 years by NRCS engineers, geologists, biologists, agronomists, and other specialists to arrive at the current national standards and specifications. Modifications for California conditions have been made for some practices, as needed. The expected environmental impacts of each practice under California conditions have been assessed and documented in Conservation Practices Physical Effects included in the NRCS FOTG. This documentation is on file for public inspection at the Marin RCD office, 80 Fourth Street, Point Reyes Station, CA 94956. It is also available on the RCD's website at http://www.sonomamarinrcds.org/district-mc/index.html.

Signature	Date
Printed Name	For

OVERVIEW: MARIN COASTAL WATERSHEDS PERMIT COORDINATION PROGRAM

Background

The Marin Coastal Watersheds Permit Coordination Program (PCP) was first developed in 2003 and approved in June of 2004. The Marin Resource Conservation District (RCD) and the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) were co-sponsors of the program and worked with regulators from the U.S. Army Corps of Engineers (Corps), North Coast and San Francisco Bay Regional Water Quality Control Board (RWQCB), California Department of Fish & Game (CDFG), Marin County Department of Public Works (DPW), and the Coastal Commission; Sustainable Conservation; and Prunuske Chatham, Inc. (PCI) to identify 16 conservation and restoration practices for use in the coastal watersheds of Marin County, to assess potential impacts from program implementation, and to provide avoidance and mitigation measures to reduce potential impacts to a less-than-significant level. In 2007, Point Reyes National Seashore (PRNS) joined the partnership to implement projects on National Park Service (NPS) lands.

The program and its potential impacts on the environment have been reevaluated in this Mitigated Negative Declaration (MND) and Initial Study Checklist (ISC), and the following changes have been made:

- In 2008, it was determined that federally sponsored programs can only be created by the U.S. Congress, and, therefore, NRCS cannot sponsor the permit coordination program; however, NRCS continues to be a program partner in the implementation of conservation and restoration projects under the auspices of the PCP.
- PRNS is now included as a program partner.
- As required by new state laws, procedures for consultation with representatives of the local Native American Tribe, the Coastal Miwok, are now included.
- Addenda developed between 2004 and 2010 have been incorporated into the PCP; they include minor changes to the timing of annual public review of projects and the inclusion of protective measures for the Myrtle silverspot.
- The geographic scope of the program area has been expanded to include the Sonoma County portion of Stemple Creek watershed and the Marin County portion of Estero Americano watershed.
- A new practice to provide for fish passage has been added, making the total number of practices included in the program 17.
- A monitoring program has been developed by the Marin RCD and University of California Cooperative Extension (UCCE) and incorporated into the PCP as Appendix 1.

Program Partners

Established in 1960, the mission of the Marin RCD is to conserve and enhance Marin County's natural resources, including its soil, water, vegetation, and wildlife. The RCD has administered over $12 million of government and private foundation grants for watershed-wide planning, erosion control, and restoration projects. Today, the Marin RCD continues to bring together state, federal, and local agencies with private landowners to conserve soil and water resources. Projects focus on:

- Control of soil erosion,
- Riparian habitat restoration,
- Protection and improvement of water quality,
- Education and outreach,
- Water conservation,
- Control of noxious and invasive weeds,
- Conservation of rangeland, cropland, and forest, and
- Active support of the district's agricultural economy and heritage.

The California Public Resources Code (PRC) specifically empowers any resource conservation district to manage soil and water conservation, erosion prevention, and erosion control and stabilization projects (PRC §9415). The code also allows an RCD, with the consent of affected private property owners, to make improvements or conduct operations that will further water conservation and the prevention and control of soil erosion (PRC §9409).

NRCS provides financial and technical assistance to private landowners (termed "cooperators") working in partnership with the Marin RCD or NRCS to develop conservation systems uniquely suited to their land and individual way of doing business. NRCS, originally established in 1950 as the Soil Conservation Service, builds on the strength of 75 years of natural resource protection on private lands and works closely with local RCDs and other agencies, organizations, and individuals to prioritize conservation goals, work with people on the land, and provide technical assistance. NRCS technical standards and specifications for these 17 and other conservation practices are available on the Internet: (http://efotg.nrcs.usda.gov/efotg_locator.aspx?map=CA).

PRNS was established in 1962 and is operated by the National Park Service under the U.S. Department of Interior. PRNS encompasses numerous ecosystems, contains over 33,000 acres of designated wilderness, and supports 16% of California's flora, including 48 special-status plant species. At present, the park contains over 140 miles of hiking trails, visitor centers, biking trails, and hike-in campgrounds. In addition to public recreation, a number of historic ranches continue to operate as dairies and cattle ranches under long-term leases with NPS. The Marin Coastal Watersheds Permit Coordination Program actions within the park are largely involved with improving the sustainability and ecological integrity of these ranching operations, although some work may occur to help protect the park's natural resources from the impacts of 2.2 million visitors per year.

Marin RCD, NRCS, and PRNS employees have expertise and field experience to help land users solve their natural resource challenges and maintain and improve their economic viability. Employees bring a variety of scientific and technical skills to bear on resource planning, including soil science, fisheries biology, fluvial geomorphology, riparian botany, agronomy, biology, agro-ecology, range conservation, engineering, cultural resources, and economics. The technical support provided by RCD, NRCS, and PRNS staff to agricultural operators is based on conservation systems designed to sustain and improve soil and water quality by addressing erosion control, pesticide and nutrient management, flood control, and streambank stabilization. They employ a watershed approach to conservation that utilizes ecological principles and resource

science to evaluate and manage the aggregate effects of multiple individual land uses. Biotechnical enhancement of natural systems is achieved through installation of conservation practices such as those included in this permit coordination program.

Need for Program

Marin coastal watersheds have experienced water quality challenges and a reduction in the quality and quantity of in-stream habitat capable of fully supporting anadromous fish populations and other aquatic species due to increased fragmentation, sedimentation, water temperature, and nutrients in the watercourses. Erosion and fine sediment are pervasive throughout the program area. One of the purposes of the PCP is to minimize creation of fine sediments by controlling erosion and implementing healthy, viable land management practices.

As in many other coastal watersheds, the combination of overland runoff, streambank erosion, runoff from roads, and the effects of years of land-use disturbance have caused serious impacts on water quality, on fish and wildlife habitat, and on native flora. The links among agricultural runoff, streambank erosion, water quality, water quantity, and fish and wildlife habitat in Marin County are a concern for agricultural, conservation, and regulatory interests. Increased focus on nonpoint source pollution by federal, state, and local regulatory agencies presents ranch and dairy operators with serious management challenges.

Tomales Bay and some of its tributaries have been identified under federal Clean Water Act §303(d) as impaired due to pathogens (i.e., coliform bacteria), which required the San Francisco Bay RWQCB to establish the Tomales Bay Watershed Pathogens Total Maximum Daily Load (TMDL) to ensure protection of water contact recreational uses and Tomales Bay shellfish harvesting and to minimize human exposure to disease-causing pathogens. In 2007, the *Basin Plan* for the San Francisco Bay region was amended to incorporate a TMDL for pathogens in Tomales Bay, and an implementation plan to reduce pathogens and achieve the TMDL was developed.

In 2008, the San Francisco Bay RWQCB adopted a Conditional Waiver of Waste Discharge Requirements for grazing lands in the Tomales Bay watershed. The waiver required that landowners or operators of grazing lands encompassing 50 acres or more submit a Notice of Intent to comply with the requirements of the waiver by January 31, 2009, and complete a Ranch Water Quality Plan by November 15, 2009. The Ranch Water Quality Plan Template (SFWQCB 2009) was developed through a collaborative effort of multiple agencies (California Cattlemen's Association, Marin Farm Bureau, Western United Dairymen, Marin RCD, NRCS, MALT, RWQCB, PRNS, and Marin Organic) to assist landowners and operators in complying with the Conditional Waiver regulations.

Because agriculture is the area's predominant land use, on-farm conservation activities can lead to significant water quality and habitat improvements. Landowners in the coastal watersheds of Marin County are interested in restoring or enhancing the natural resources of their property. However, regulatory review processes that are intended to protect natural values often act as *dis*incentives to voluntary efforts to reduce nonpoint source pollution and enhance habitat. Ranch planning is a key component of this program, and the RCD, NRCS, PRNS, UCCE, and the Marin Agricultural Land Trust (MALT) have provided tailored direction on best management practices (BMPs), several of which require approval from regulatory agencies. By selecting conservation and

restoration practices suitable for coordinated review, the PCP has helped promote successful voluntary actions that have improved water quality and wildlife habitat values.

As landowners see the success of their neighbors' projects, willingness to cooperate in voluntary conservation work has increased. Marin RCD, NRCS, and PRNS staff have established relationships with individual landowners and the community that are necessary to the success of voluntary projects. They also have the expertise and funding to carry out these restoration practices and, perhaps more importantly, state and federal mandates to protect our natural resources by working with private landowners.

Existing Conditions

Topography and Geographic Scope

The Marin coastal watersheds encompass approximately 332 square miles (212,520 acres) of Marin County. The program area covers the coastal areas of the Lagunitas, Stemple, and Walker Creek watersheds, the Marin County portions of the Estero Americano watershed, and smaller, unnamed creeks leading directly to Tomales Bay and the Pacific Ocean. It also includes areas of PRNS within the program boundaries; see Figure 1.

In the northern part of the program area, topography is characterized by the relatively low hills of the Estero Americano, Stemple Creek, and northern Walker Creek watersheds. Moving south, the landscape becomes more rugged as Walker Creek and Lagunitas Creek (and its major tributary, Olema Creek) wind through narrow, steep-sided canyons.

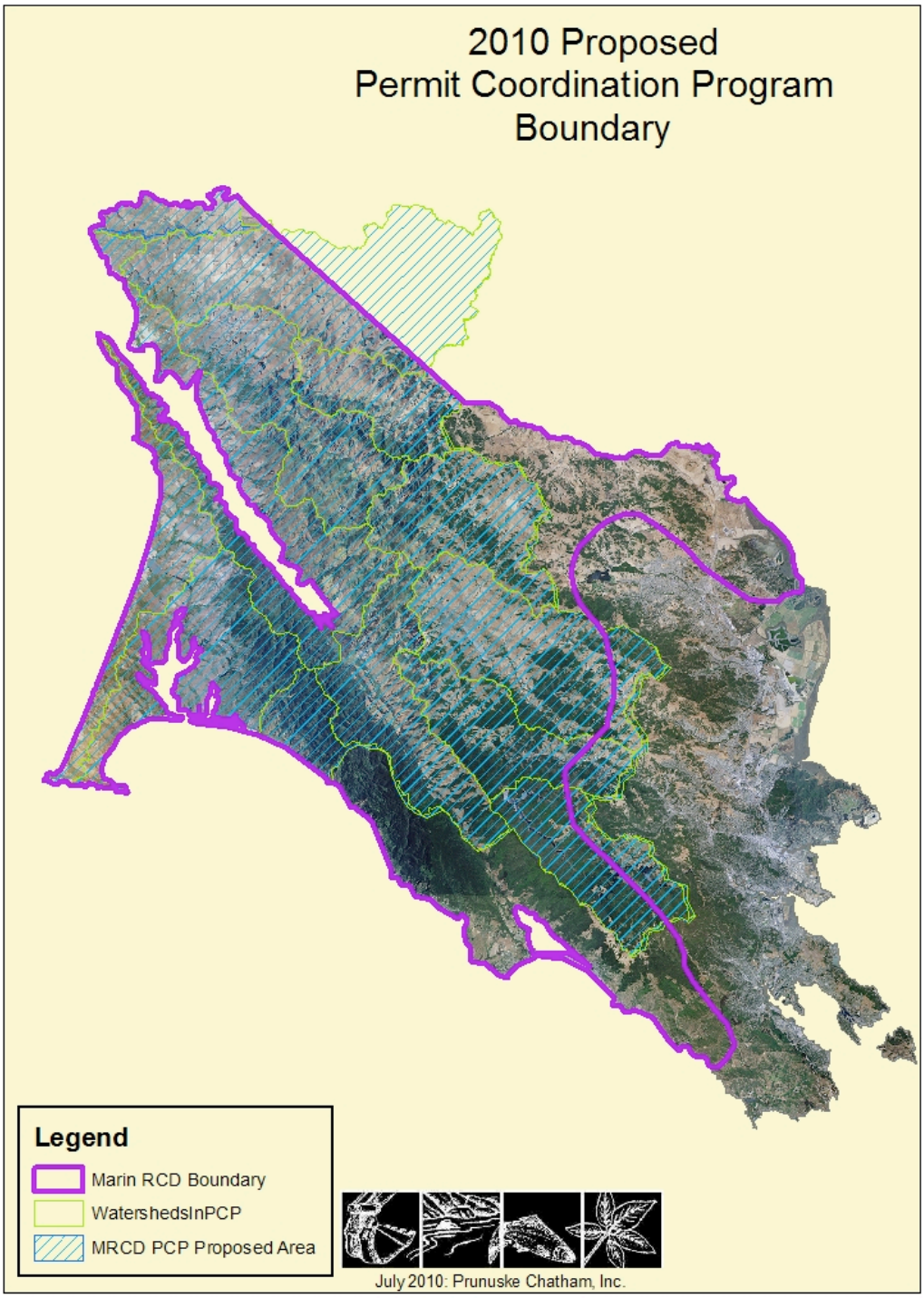
Areas not Included in the Program

Areas that have been determined to be particularly sensitive by regulators are excluded from the program area. These include:

1. The waters of Estero de San Antonio and Estero Americano.
2. Tidally influenced wetlands and waters.
3. Vernal pools.
4. Dune habitat.
5. Serpentine grasslands.

Work in these areas would require traditional, individual permitting and environmental review.

Figure 1. Map of Program Boundary



Descriptions of Natural Watercourses

- Stemple Creek:

  Stemple Creek flows westward through the watershed to its estuary, the Estero de San Antonio. The Estero empties into Bodega Bay, a broad indentation of the Pacific Coast. The stream system has a dendritic (branching) drainage system in the eastern third of the watershed. Stemple Creek originates in the northeast corner of the watershed and flows southwesterly to a point near Two Rock, where two unnamed streams join it. From there to the coast, the drainage pattern is trellis-like, with numerous parallel tributaries entering the main stem from the north and the south. Stemple Creek becomes the Estero de San Antonio just west of Highway 1. U.S. Geological Survey maps show the main stem of Stemple to have perennial flow from the Two Rock area to the coast.

- Walker Creek:

  The headwaters of Walker Creek lie in both Marin and Sonoma Counties. The creek runs west to where it enters Tomales Bay near the once historic town of Hamlet. The creek flows through an alluvial valley encircled by gently rolling hills. The watershed contains 73 square miles, some of which lie outside the program area; it contains 4 main sub-watersheds—Chileno Creek, which flows through Chileno Valley; Arroyo Sausal and Salmon Creek, which flow through Hicks Valley; and Keys Creek, which flows through the low hills east of Tomales. Stream channels in the upper watershed, including Arroyo Sausal, Salmon Creek, and the mainstem of Walker Creek, have downcut dramatically, leaving old stream terraces high above the channel. Soulajule Reservoir, built and maintained by the Marin Municipal Water District (MMWD), isolates Arroyo Sausal from the rest of the watershed approximately 2.75 miles upstream of Walker Creek.

- Lagunitas Creek, including Olema Creek:

  Lagunitas Creek is the largest drainage emptying into Tomales Bay. Much of the 103-square mile watershed consists of open space and watershed land; a few beef ranches occur in the lower areas. The watershed originates on the northern slopes of Mount Tamalpais and flows northerly for approximately 25 miles before entering the bay. Five main tributaries feed Lagunitas Creek — Nicasio Creek, San Geronimo Creek, Olema Creek, Devil's Gulch, and Deadman's Gulch. Flows within the watershed are highly regulated by reservoirs in the upper watershed; only San Geronimo Creek and Olema Creek are not regulated. Relative to other streams in the program area and throughout coastal California, Lagunitas Creek is in good condition and supports notable runs of steelhead trout and coho salmon.

- Estero Americano:

  The Estero Americano is a coastal estuary at the base of Americano Creek. It forms a portion of the northern boundary between Marin and Sonoma Counties where it drains into Bodega Bay. In some years, a seasonal sand bar at the mouth restricts tidal exchange. Periods of hypersalinity have been recorded in the Estero. When the mouth is open, the tidal influence ranges up to 4 miles upstream. Americano Creek, the sole tributary of the Estero, is ephemeral and generally dries up for 4 to 6 months between late spring and fall.

- Other small tributaries:

  The program area also includes many small, primarily unnamed tributaries draining directly to Tomales Bay or the Pacific Ocean, including lands on the Point Reyes Peninsula. Several, including Schooner and Home Ranch Creeks, are known to support steelhead populations. Most, however, are believed to be nonfish-bearing streams, although potential usage by strays is considered possible.

Existing Land Uses

The following is excerpted from the Marin Coastal Watersheds Enhancement Project, prepared by UCCE in 1995 and from the Tomales Bay Watershed Council's website watershed description, current in 2010:

The land area draining into Tomales Bay is nearly 20 times the size of the bay itself. The watershed area is 255 square miles. The bay, sitting atop the San Andreas Fault, is 12 miles long and only about 1 mile wide. Creeks flow into Tomales Bay from Mt. Tamalpais and Bolinas Ridge to the south, Inverness Ridge to the west, and Walker Creek watershed to the east.

Public lands within the watershed include all of Tomales Bay State Park, Samuel P. Taylor State Park, and Inverness Public Utility District and parts of PRNS, Golden Gate National Recreation Area, and Marin Municipal Water District (MMWD) lands. The Tomales Bay waters are part of the Gulf of the Farallones National Marine Sanctuary.

Eleven villages lie within these natural boundaries. Human populations have been increasing. An estimated 11,000 people live here, and 2.5 million people visit annually.

The watershed supplies water, provides recreational opportunities, and supports dairy and beef ranching, farming, agriculture, commercial fishing, and mariculture. Tomales Bay watershed is home to rich wildlife communities, including nearly 470 species of birds. Coho salmon, steelhead trout, and California red-legged frog are important examples of threatened and endangered species that rely on habitats here.

The predominant land use in much of the northern part of the program area is, and has been for over 100 years, animal agriculture, including beef, sheep, and dairy production. Eighty percent of the watershed is used for agriculture, primarily for grazing dairy and beef cattle. At one time, cultivated crops, including potatoes and hay, also played an important role in the local economy. Other land uses now include non-agricultural open space and recreation. Tomales Bay and its tributaries also support commercial shellfish production and commercial and recreational fishing.

The importance of the different agricultural commodities produced in this region has ebbed and flowed over the years and has varied somewhat by watershed due to the suitability of the land and climate for producing different crops. Dairying, which was widespread throughout West Marin at one time, is now concentrated in the northern part of the program area, where topography is gentle, rural residential development is less extensive, and grasslands are the predominant vegetation type. Beef ranching and some sheep ranching also occur throughout the area. Scattered throughout the agrarian setting are several small communities, which originated as agricultural and fishing villages and summer touring destinations.

Further south in the Lagunitas Creek watershed, logging was once an important industry. Logging tapered off from the 1930s to the 1960s. Much of this area is now owned by MMWD and used to supply water to residents of East Marin. Samuel P. Taylor State Park protects the riparian and adjacent areas through the Lagunitas Creek watershed just west of the confluence with San Geronimo Creek, a significant tributary. Along San Geronimo Creek, the high elevation areas are largely protected lands, with some embedded agriculture. In addition to publicly protected lands, some land is protected in private ownership. Spirit Rock, a religious center for local and traveling practitioners, protects 400 acres managed for highest ecological value. Along the creek, the small communities of Woodacre, San Geronimo, Lagunitas, and Forest Knolls are primarily residential with limited business supporting residents and tourism. The area has almost no industrial development.

Several agricultural facilities operate on the Point Reyes peninsula, which is federal parkland in the Point Reyes National Seashore. NPS leases land to agricultural operators, many of whom are served by Marin RCD or NRCS, as well as PRNS staff. Although these lands are publicly held, they are included in the program area in order to provide the operators with the opportunity to improve the lands by installing erosion control and habitat improvement projects.

PROGRAM DESCRIPTION

General Description of Proposed Action

The Marin Coastal Watersheds Permit Coordination Program has and will continue to provide the catalyst for high-quality pollutant and erosion control and habitat restoration projects throughout the program area. It is based on a model of coordinated, multi-agency regulatory review that ensures the integrity of agency resource-protection mandates. However, it allows permitting to be more accessible to farmers and ranchers than the traditional processes.

Through the program, the Marin RCD applies to the appropriate regulatory agencies for permits for all of the projects to be implemented in that year and manages the process of regulatory approval. Landowners and operators contract with the RCD, NRCS, or PRNS to work under their supervision in accordance with the conditions of permit approval and the avoidance and mitigation measures described herein. In the case of CDFG permits, a §1602 Routine Maintenance Agreement (RMA) for the 17 restoration practices may be issued to the RCD for a 5-year period with annual review by CDFG of proposed work. The RMA can only be used if the RCD, NRCS, or PRNS will perform the work or enter directly into the construction contract. If landowners or operators choose to implement projects themselves or to engage their own contractor, CDFG will review their project separately and issue a project-specific §1602 Lake and Streambed Alteration Agreement to the landowner or operator.

Each year, the Marin RCD, NRCS, and PRNS will review the proposed projects to ensure that they meet the requirements of the program as described in this MND/ISC. Factors considered will include project area, actions, and size and sensitive resources. Table 1 contains a description of each practice included in the PCP, and Table 2 contains limitations on the dimensions and volumes. Appendix 2 contains the project-specific CEQA checklist that will be used in the annual evaluation of projects for

inclusion in the program. The Marin RCD Board of Directors will then consider eligible projects for inclusion in yearly permitting at a publicly noticed meeting.

Actions permitted on lands in the Marin coastal watersheds under the auspices of this program are limited to implementation and maintenance of the following 17 conservation and restoration practices. Discussion of actions not included in the program follows Table 2. When regulatory agencies have different standards for issuing permits, this program adopts the most restrictive; when this program references other documents that may contain less restrictive standards, only the more restrictive standards will be used.

Conservation and Restoration Practices Included in the Program

The following 17 conservation and restoration practices are included in the permit coordination program. Conditions to avoid or minimize adverse impacts begin on page 24. Potential impacts are analyzed in the Initial Study Checklist.

Table 1: Conservation and Restoration Practices Included in the Program

Access Roads (560)	Improvements to *existing* fixed routes for moving livestock, produce, or equipment. The practice provides access for property management while controlling runoff to prevent erosion and maintain or improve water quality. An example of the practice is regrading and outsloping a road so that water is less erosive as it travels across the road.
Animal Trail and Walkway (575)	Creation of a travel lane for animals to traverse difficult or ecologically sensitive terrain. This practice may be installed on grazing lands as part of a conservation plan to improve access to forage or water. It is designed to divert livestock away from ecologically sensitive or erosive sites.
Critical Area Planting (342)	Stabilization of soil by planting vegetation, such as trees, shrubs, vines, grasses, or legumes, on highly erodible or critically eroding areas; it does not include tree planting mainly for wood products. This practice reduces damage from sediment and runoff to downstream areas and improves wildlife habitat and visual resources. It can be used to replant areas where invasive vegetation has been removed or as an ancillary to stream restoration activities. Native plants characteristic of the local habitat type are the preferred alternative when implementing and maintaining the practices in natural areas.
Filter Strip (393)	Installation of a strip or area of vegetation for removing sediment, organic matter, and other pollutants from runoff and wastewater. This practice is used between agricultural land and environmentally sensitive areas. When the field borders are located such that runoff flows across them in sheet flow, coarser-grained sediments are filtered and deposited. Pesticides and nutrients are removed from runoff through infiltration, absorption, adsorption, decomposition, and volatilization, thereby protecting water quality downstream. When established, filter strips may also reduce erosion.

Fish Passage (396)	Modification or removal of barriers that restrict or impede movement or migration of fish or other aquatic organisms. This practice allows aquatic organisms access to additional upstream and downstream habitat by improving connectivity and provides enhanced riparian and aquatic habitat and wildlife corridors. Additional benefits derived from the practice include improved water quality, floodplain erosion protection, restoration of natural plant communities, and increased carbon storage.
Grade Stabilization Structure (410)	Stabilization of a gully or downcutting channel by installing a structure to control the grade and/or stabilize the slope. This practice prevents headcutting and formation or advancement of gullies and enhances the natural functioning of the channel, including raising the water table and allowing for establishment of vegetation. This practice refers to brush, erosion-control fabric, rock, or timber structures that do not impound water but rather allow water to be conveyed in a stable manner, resulting in reduced erosion and improved downstream water quality. This practice is intended to promote biotechnical approaches; hard structural solutions will be recommended only in unusual circumstances and will require justification in order to secure regulatory approval.
Grassed Waterway (412)	Installation of a constructed waterway or enhancement of a natural waterway that does not have a defined bed and bank and that is shaped or graded to required dimensions and velocities and then planted with suitable vegetation for the stable conveyance of runoff. This practice is designed to reduce erosion in a concentrated flow area such as a gully in order to reduce sediment and substances delivered to receiving waters. Vegetation may act as a filter in removing some of the sediment delivered to the waterway, although this is not the primary function of a grassed waterway.
Lined Waterway (468)	Placement of an erosion-resistant lining (e.g., erosion-control blanket) along a gully or outlet. The lined waterway allows for the safe disposal of runoff from other conservation structures or from natural concentrations of flow where unlined or grassed waterways would be inadequate. The practice is not used for irrigation water conveyance.
Pipeline (516)	Installation of a pipeline for conveying water for livestock from a source of supply to point of use for the purpose of directing livestock away from springs, streams, and lakes. This practice is designed to reduce bank erosion, sediment yield, and manure in watercourses. This practice is included in the permit coordination program when it crosses a stream or watercourse.

Sediment Basin (350)	Construction of basins to collect and store debris or sediment. Sediment basins trap sediment, sediment-associated materials, and other debris. They prevent undesirable deposition on bottom lands and in waterways and streams. Basins are generally located at the base of agricultural lands adjacent to natural drainage or riparian areas. The practice does not treat the source of sediment but provides a barrier to reduce degradation of surface water downstream. The design of spillways and outlets will include water control or energy dissipation structures to prevent scouring at discharge point into natural drainage. Sediment basins will be installed for the purpose of controlling fine sediments. They are often installed in conjunction with measures to control upstream sediment sources. When the source of the erosion is off property or inaccessible, a sediment basin is an appropriate stand-alone practice.
Spring Development (574)	Improvement of springs and seeps by fencing out livestock, excavating, cleaning, capping, or providing collection and storage facilities. Spring development is included in this program for circumstances where developing a spring will have minimal effects on spring habitat and provide water quality improvements to nearby waterways. Spring development may not result in impacts on or drying up of wetlands and cannot result in a loss of wetland habitat that relies on the spring as a water source. This practice is used to improve the distribution of water or to increase the quantity of water for livestock and wildlife. Water-bearing soil and rocks are developed, and piping is installed to a trough or tank away from the spring. A wooden or concrete box backfilled with gravel may also be constructed to hold the water to be piped. The area around the spring may be fenced to control livestock and, therefore, improve the wildlife habitat value of the spring or seep. Developing sources of water away from riparian areas and waterbodies is designed to reduce the impacts of livestock on those areas. Development is confined to springs or seepage areas that can furnish a dependable supply of water. Spring development uses an excavation process that does not result in the placement of fill in or around spring areas.

Streambank Protection (580)	Installation of vegetation or other treatments to stabilize and protect banks of streams or excavated channels against scour and erosion. The banks of streams and waterbodies are protected to reduce sediment loads causing downstream damage and pollution, improve the stream for fish and wildlife habitat, and protect adjacent land from erosion damage. This practice is intended to promote biotechnical approaches; hard structural solutions will be used only in unusual circumstances and will require justification in order to secure regulatory approval. Streambank protection measures that involve riprap, rock, or other structural components used to prevent localized stream erosion, sediment transport, or movement will require conventional permitting and are not authorized in the permit coordination program. However, rock used to facilitate natural stream processes and dynamics with the purpose of achieving stream equilibrium between erosional and depositional processes will qualify for inclusion in the permit coordination program. This practice can be applied to natural or excavated channels where the streambanks are susceptible to erosion from the action of water or debris or due to damage from livestock or vehicular traffic.
Stream Channel Stabilization (584)	Stabilization of a streambed with suitable structures or plantings. This practice is used in stream channels that are undergoing damage or degradation that cannot be controlled with upslope practices. The design and installation of stream channel stabilization structures produce a stable streambed favorable to wildlife and riparian growth. Stream channel stabilization structures that involve riprap, rock, or other structural components used to prevent localized stream erosion, sediment transport, or movement will require conventional permitting and are not authorized in the permit coordination program. However, rock used to facilitate natural stream processes and dynamics with the purpose of achieving stream equilibrium between erosional and depositional processes will come under the permit coordination standards. This practice is intended to utilize in-stream structures made of natural materials such as boulders and logs to provide channel stability.

Stream Habitat Improvement (395)	Restoration, improvement, or maintenance of aquatic habitat by improving physical, chemical, or biological conditions of the stream and associated riparian zone. This practice is used to improve or enhance aquatic habitat for fish or other aquatic organisms in degraded streams and ditches and to improve conditions that maintain ecological processes and connections by implementing one or more of 13 specific actions, including managing nutrients and excessive runoff, controlling erosion, restoring riverine wetlands, maintaining instream flows, restoring flood plain connectivity, ensuring up- and downstream passage, managing invasive species, and providing instream habitat elements such as large wood, spawning gravels, and pool and riffle structure. Improved flood plain connectivity allows development of backwaters, wetlands, and off-channel habitat consistent with local climate and hydrology. Pools and riffles are formed in degraded stream sections through the strategic placement of root wads or natural rock that reduces the flow velocity through the area. Although this practice may require the placement of rock, use of rock is kept to a minimum. Multilayer riparian plantings provide shade to keep temperatures low, improve water quality by capturing contaminants from runoff, and provide an improved food base for aquatic systems. Dissolved oxygen content may be increased, improving the stream's assimilative capacity. The practice works within the hydrologic and geomorphic context of the watershed as a whole, including managing upland land use that adversely affects aquatic and riparian function.
Structure for Water Control (587)	Removal or replacement of existing culverts in streams and other waterways when they are either not functioning properly or are a barrier to fish passage. This practice is intended to remove culverts entirely where possible. Careful consideration will be given to addressing upslope sources of flow that are causing the need for a culvert (i.e., rather than replacing an undersized or defective culvert in an in-sloped road with a properly sized, functioning culvert, the road will be outsloped to eliminate the need for the culvert). If determined to be environmentally beneficial, new culverts may also be installed under this program. New or replacement culverts will be sized for a 24-hour, 25-year storm event hydraulic capacity, but smaller culverts may be used (minimum 10-year storm event hydraulic capacity but not less than 15 inches in diameter) if topography and overflow facilities exist to prevent damage from larger storms.
Underground Outlet (620)	Conveyance of surface water to a suitable outlet through a conduit installed beneath the surface of the ground. Clean runoff from ranchland or farmland can be conveyed to a stream or other waterway using this practice, which is designed to prevent concentrated surface flow that could cause erosion or transport of nutrients. The outlet of the pipe to a stream or other waterway will include an energy dissipater. Underground outlets will be designed to avoid adverse alteration of a stream hydrograph.

Water and Sediment Control Basin (638)	Construction of an earthen embankment or a combination ridge and channel across the slope and minor watercourses to form a sediment trap and water detention basin. These basins reduce concentrated off-site flow and associated erosion by metering out runoff following large storm events. This practice traps and removes sediment and sediment-attached substances from runoff. Basins are often located alongside riparian or wetland environments to buffer impacts of upslope runoff and sediment prior to release to a natural drainage. The minimum design capacity will ensure detention of a 10-year, 24-hour storm event. Outlet design for a 24-hour release period results in sediment deposition and drains the basin in anticipation of additional rainfall. This practice will not be used in a stream channel or other permanent waterbodies.

Limitations on Project Size

The conservation projects are limited in size. The estimates of average figures are based on typical projects installed in the watersheds in the last 20 years. These maximums are based on definitions of small projects from regulatory agencies.

Table 2: Maximum Grading Dimensions & Volumes Associated with Implementation of Practices

Conservation Practice	Length (Feet)	Dimensions (Acres)	Volume (Cubic Yards)
Access Roads	1 mile*		4,000
Animal and Livestock Cross	10-15 wide	0.125	250
Critical Area Planting	2,000	1	500
Filter Strip	500	1	1,500
Fish Passage	300	0.25	1,000
Grade Stabilization Structure	Crosswise structure – 60 across x 20 stream length Lengthwise structure – 20 across x 60 stream length	N/A	100 cubic yards per structure of fill
Grassed Water Way	2,000	2.5	2,000
Lined Waterway	300	0.05	1,000
Pipeline	50 (along the channel)	0.25	50
Sediment Basin	N/A	1	1,500
Spring Development	N/A	0.05	50
Stream Channel Stabilization	500	1	7,500
Streambank Protection	500	0.5	7,500
Stream Habitat Improvement	2,000	3	1,000
Structure for Water Control	100	0.25	500
Underground Outlet**	N/A	0.10	20
Water and Sed. Control Basin	N/A	1	1,500

* Access road improvements typically involve multiple installations spread out over a long reach of road. The 1-mile maximum on roadwork covers the cumulative area of disturbance; however, the reach of road improved may be much longer than 1 mile.

** Dimensions are only for the outlet for the energy dissipater.

The 17 conservation practices included in the program are recommended by the U.S. Environmental Protection Agency, California State Water Resources Control Board, California Coastal Commission, and CDFG as appropriate resource management practices to protect and restore fish and wildlife habitat. They are designed to control erosion and sedimentation; to increase aquatic, riparian, and upland habitat values; and to stabilize streambanks and channels. The estimated number of projects that will be implemented annually is 5-10.

Actions not Included in the Program

This permit coordination program does not include projects that involve water diversions or dams. Stream channel stabilization structures that involve riprap, rock, or other structural components used to prevent localized stream erosion, sediment transport, or movement are classified as stream channel hardening projects and are not authorized by the PCP. Landowners working with Marin RCD, NRCS, or PRNS on projects that do not qualify for this permit coordination program, either because they involve actions other than the 17 listed practices or they cannot meet the size limits or permit conditions, must use the traditional permit mechanism wherein the RCD and the landowner are responsible to comply with CEQA on a project-by-project basis and obtain individual permits.

For any project that is likely to adversely affect federally or State-listed plants, animals, or their critical habitat, consultation under the federal and/or California Endangered Species Acts (ESA and CESA, respectively) will occur to develop project-specific avoidance and mitigation measures and to obtain valid permits. Consultation with NOAA Fisheries and/or USFWS will be initiated by NRCS for projects funded through their programs or by the U.S. Army Corps of Engineers. CDFG will be consulted for all projects that may adversely affect species listed under CESA.

Project Selection Process and Impact Assessment

Technical Advisory Committee

Marin RCD has formed a Technical Advisory Committee (TAC) composed of representatives from the RCD, NRCS, PRNS, STRAW (Students and Teachers Restoring a Watershed), UCCE, SFBRWQCB, project funders, and technical consultants. The purpose of the TAC is to guide the development of projects to ensure selection of the optimal set of conservation practices to maximize resource protection and enhancement. The TAC tours potential project sites; meets with landowners and operators to identify resource problems, determine objectives, and agree upon goals; and provides ranking and recommendations to the Marin RCD Board of Directors.

Project Selection Criteria

The TAC has developed selection criteria and a ranking system to ensure projects will improve habitat conditions and water quality. A selection committee is formed annually to review and rank potential projects and to determine their qualification for inclusion in the PCP. Examples of questions that the project selection committee uses include:

- Will the project occur in a biologically important subwatershed?
- Is the project contiguous with existing high-quality habitat?
- Will the project support a diversity of plant/animal species?
- Will the project create or improve habitat for rare, threatened, or endangered species?
- Will the project support sensitive life stages of species (nesting, spawning, etc.)?
- Will the project restore an impaired watershed process? (sediment, nutrients, temperature, etc.)?
- Will the project improve stream geomorphic functions?
- Is the project technically sound, effective, and appropriate?
- Will the project address causes rather than symptoms?
- Will matching funds/in-kind services be applied to the project?
- Is the project financially sound, effective, and appropriate?

Individual Project Background Scoping and Impacts Assessment

Once a project has been selected, a preliminary design is developed that includes project boundaries, access, and equipment required for implementation. Potential impacts on cultural and biological resources are evaluated in cooperation with the project biologist and the Federated Indians of Graton Rancheria (FIGR). Site visits occur, as needed, to identify potential impacts and avoidance and mitigation measures that will become part of the project description and permit requirements.

RCD staff and technical consultants review the preliminary design, potential impacts, and proposed avoidance measures to determine if the project fits within the requirements of the PCP, which include the maximum grading dimensions and volumes found in Table 2. Specific conditions to avoid or minimize adverse impacts are summarized in the Environmental Protections and Mitigation Measures section beginning on page 22 and are analyzed for specific environmental resources in the Initial

Study Checklist beginning on page 39. Specific conditions to avoid or minimize adverse impacts include design specifications; temporal limitations on construction; limitations on construction equipment, earthmoving, use of rock and other hard structures, and use of pesticides, herbicides, and fertilizers; and requirements for erosion control.

Regulatory Agency and Public Review of Individual Projects

After project identification and ranking by the TAC and assessment of potential impacts in the spring of each year, a conceptual design is developed and submitted to regulators and FIGR for review. Site visits are arranged, upon request, to evaluate options and potential impacts. Input from regulators is then incorporated into preliminary project designs.

In the spring of each year, after development of preliminary designs, the RCD provides a notice in the *Pt. Reyes Light* that the Board of Directors will hear public comments on the projects proposed for the coming construction season at a regularly scheduled meeting. In addition, the public may submit written comments to the Board prior to the meeting for consideration before the Board makes final project decisions. Following the Board's approval of proposed projects, final designs and permit applications are prepared and submitted to regulators.

Description of Programmatic Permitting Mechanisms

To assist agricultural landowners with regulatory compliance, the Marin RCD seeks to offer "one-stop permiting" to landowners in Marin coastal watersheds who agree to work under the guidance of the RCD, NRCS, and/or PRNS to achieve important water quality and habitat conservation and restoration goals. Approval of projects being implemented under the program that year is obtained from local, state, and federal agencies with jurisdiction over one or more of the 17 conservation practices included in the program. Following is a list of agencies that may issue permits under the permit coordination program and the type of permit or approval:

- California Department of Fish and Game – California Fish & Game Code §1602 Lake and Streambed Alteration or Routine Maintenance Agreement and CESA Incidental Take Permit or Consistency Determination.
- North Coast or San Francisco Bay Regional Water Quality Control Board – Waste Discharge Requirements or Clean Water Act §401 Certification.
- U.S. Army Corps of Engineers – Clean Water Act §404 Nationwide Permits.
- County of Marin – Determination of Consistency with Local Coastal Plan, Grading Permit, and Creek Permit.
- California Coastal Commission – Coastal Development Permit.
- U.S. Fish and Wildlife Service – Endangered Species Act (ESA) Section 7 Consultation/Incidental Take Statement.
- NOAA Fisheries – ESA Section 7 Consultation/Incidental Take Permit.
- California Department of Transportation – Road Encroachment Permit.
- Gulf of Farallones National Marine Sanctuary – Sanctuary Permit.

Specific permit terms and conditions are included with the individual design standards and specifications for each project implemented under this program. They are included as conditions of the contract between the landowner and the Marin RCD, NRCS, or

PRNS. Individual property owners and managers participating in this program are referred to as "cooperators."

Planning and Permitting Mechanisms for Individual Projects

Individual Project Notification to Regulators

By May 15 of each year, the Marin RCD will provide the regulators listed above, as applicable, with a Joint Aquatic Resources Permit Application (JARPA) for all projects being constructed under the PCP for that year. The JARPA will include the following information:

- Project identification and location.
- Nature of work and description of project need.
- Approved practices to be installed.
- Location of work to be performed.
- Project dimensions (volume, length and area, if applicable)
- Approximate volume of discharge below the ordinary high water mark (OHWM).
- Total disturbed area.
- Quantitative assessment of temporary impacts on native vegetation, including number and size of trees, approximate species diversity, approximate coverage of herbaceous species, and relevant revegetation plans.
- Environmental setting – surrounding habitat, adjacent land use.
- Potential presence of listed species.
- Avoidance measures to be used during project implementation.

Regulators will review the individual design and construction specifications for each proposed project. They may request a meeting or site visit(s) to review the projects and may provide additional conditions to the Cooperator Agreement for individual projects, which will be included as part of the individual project plan. For example, the San Francisco Bay RWQCB has identified key provisions for their approval of individual projects to ensure that the projects implemented are adequately protective of water quality and beneficial uses:

1. Site reconnaissance, arranged in advance, with RCD, NRCS, and/or PRNS personnel or their representatives, as well as other regulatory agencies and technical experts, if possible, during the pre-project design phase in order to identify site constraints and the range of acceptable conservation and restoration practices.
2. Submission of preliminary project designs.
3. Follow-up site visit, as needed and arranged in advance with RCD, NRCS, and/or PRNS personnel or their representatives, to finalize design.
4. Submission of final design and supporting information regarding environmental impacts on resources and species at project site.
5. Written approval by Water Board Executive Officer.
6. Optional site visit(s), arranged in advance with RCD, NRCS, and/or PRNS personnel or their representatives, during construction and after project completion.
7. Annual post-project monitoring report.

Procedures for Complying with Permit Conditions and to Address Noncompliance

Permit conditions will be included in the Cooperator Agreement and the construction contract, and they will be summarized and reviewed with the construction crew prior to project implementation. A pre-construction crew training will provide all workers with information on sensitive resources, including rare, threatened, and endangered (RTE) species and cultural artifacts, and the specific protective measures to be followed during implementation of the practices. The project boundaries will be clearly demarcated to avoid impacts on sensitive resources.

If a cooperator does not carry out work in compliance with project design standards and specifications, including the previously agreed upon terms and conditions, the RCD, NRCS, and/or PRNS will notify the cooperator and work directly with them to resolve the problem. If the cooperator still fails to conform, the RCD, NRCS, and/or PRNS will notify the cooperator that their activities are inconsistent with the standards and specifications contained in their contracts and that the cooperators' actions are no longer covered by the project's programmatic and individual permits and agreements. The cooperator will then be responsible for obtaining regulatory review and individual permits from the appropriate regulatory agencies and will be held liable for all violations.

ENVIRONMENTAL PROTECTION AND MITIGATION MEASURES

The intent of the permit coordination program and the associated conservation and restoration practices is to reduce erosion and sedimentation and to enhance habitat values in the watersheds of coastal Marin County. Project implementation will maximize water quality and/or the health of the natural resources and will contribute to agricultural sustainability. Work in areas with sensitive resources has the potential to negatively affect those resources without careful planning. Thorough environmental protection measures have been developed in coordination with regulatory agencies to prevent or reduce the environmental impacts of restoration under the permit coordination program. When regulatory agencies have different standards for issuing permits, this program adopts the most restrictive. When this program references other documents that may contain less restrictive standards, only the more restrictive standards will be used.

These protective measures are intended as minimum conditions that will be incorporated into the design and implementation of each site-specific restoration project under the permit coordination program. With the incorporation of the protective measures, any potential environmental effects of the permit coordination program are avoided or reduced to less-than-significant levels. In addition, the permit coordination program allows for each regulatory agency to impose more stringent conditions on a site-by-site basis if those more stringent conditions will result in greater resource protection.

The minimum protective measures are described in detail below. They include general conditions such as temporal limitations on construction, limitations on earthmoving and construction equipment, guidelines for removal of plants and revegetation, conditions for erosion control, limitations on work in streams and permanently ponded areas, and limitations on use of pesticides, herbicides, and fertilizers. They also include detailed protective measures required for specific conservation practices.

Conditions to Avoid or Minimize Adverse Impacts

The RCD, NRCS, and/or PRNS and participating regulatory agencies have developed the following measures that are intended to avoid or minimize program impacts on sensitive resources. Measures from the Initial Study Checklist are denoted with {ISC-section-X} with "section" being an abbreviation of the resource section and "X" being the avoidance measure number from that section.

1. Program Design Specifications (DS)

The RCD, NRCS, and/or PRNS will design projects according to NRCS practice specifications and incorporate the following guidance to avoid adverse impacts:

- **DS – 1:** If an irrigation system is to be installed for establishment-period watering and it relies on water from a stream or creek, it will meet NOAA Fisheries Water Drafting Specifications (August 2001, or as updated). In addition to water drafting specifications, projects that are implemented within fish-bearing streams will meet NOAA Fisheries Fish Screening Criteria (1997) and the addendum for Juvenile Fish Screen Criteria for Pump Intakes (May 9, 1996).

- **DS – 2:** Sediment basins will be installed for the purpose of controlling fine sediments. They will not be constructed in any perennial or intermittent stream channel or other permanent waterbodies.

- **DS – 3:** Sediment basins will be designed to avoid permanently ponding water. Water will be held only for the amount of time necessary to allow fine sediment to settle out.

- **DS – 4:** The outlet control for water and sediment basins will be designed to hold water no longer than is needed to reduce design storm peak discharges to the stream and prevent ponding, stagnation, and eutrophication of the water.

- **DS – 5:** The fish stream improvement practice will be designed and implemented in accordance with CDFG's *California Salmonid Stream Habitat Restoration Manual*.

- **DS – 6:** The RCD, NRCS, and/or PRNS will consult with CDFG personnel when designing fish stream improvement projects.

- **DS – 7:** Culverts in fish-bearing streams will be consistent with CDFG's "Culvert Criteria for Fish Passage" (September, 2001) and NOAA Fisheries Southwest Region's "Guidelines for Salmonid Passage as Stream Crossings" (September, 2001).

- **DS – 8:** An energy dissipater will be installed on outlets from underground outlets, water and sediment basins, and other outlets to reduce bed and bank scour.

- **DS – 9:** Underground outlets will be designed so as to avoid negative alterations to a stream hydrograph.

- **DS – 10:** Where work will occur in coastal terrace prairie or northern maritime chaparral, the site will be surveyed by a qualified botanist prior to project design.

The botanist will provide a site map and design recommendations to avoid listed plants and preserve important habitat elements.

- **DS – 11:** Where work will occur in Unique Farmland or Farmland of Statewide Importance, and project design would remove any farmland from productive use, care will be taken to ensure that plantings and other design elements are not irreversible.

2. Temporal Limitations on Construction (TL)

The RCD, NRCS, and/or PRNS will ensure that adverse impacts do not occur during routine operations by implementing the following temporal limitations on construction:

- **TL – 1:** The timing of project construction will take into consideration fisheries and other wildlife usage in the project area. Practices will be implemented in the period between June 1 and October 15, unless site and project-specific recommendations from the project biologist suggest a superior work window to avoid impacts on special-status species. Alterations to timing must be approved by CDFG. Work in and around streams that support anadromous fish populations or California freshwater shrimp may not begin until June 15. {ISC–BIO}. Work beyond October 15 may be authorized on a site-specific basis with approval from the North Coast or San Francisco Bay RWQCB, CDFG, USFWS, and/or NOAA Fisheries and provided the work would be completed prior to first winter rains and stream flows. Planting may occur after October 15 if success of vegetation is increased due to favorable environmental conditions. Planting above the ordinary high water line may occur at any time of the year.

- **TL – 2:** Excavation and grading activities will occur only in dry weather periods. Pipeline in stream channels will be installed only when the streambed is dry. {ISC-HAZ}

- **TL – 3**: Upon completion of grading, slope protection of all disturbed sites will be installed prior to the onset of rain through a combination of permanent vegetative treatment, mulching, rock, and/or other treatments developed as appropriate by the restoration community and approved by CDFG and RWQCB.

- **TL – 4:** Where habitat for federal and state-listed species is identified on or adjacent to the project work site, construction and activities that may disturb the breeding, feeding, mating, and/or sheltering of these species will be performed only as prescribed by NOAA Fisheries, USFWS, and/or CDFG.

- **TL – 5:** Construction within 75 feet of established riparian vegetation will be avoided during the migratory bird nesting season (February 15 to August 15). If work must occur during this period, a qualified biologist or individual approved by CDFG will conduct a pre-construction survey for bird nests or nesting activity in the project area. If any active nests or nesting behavior are found (for species other than starlings and house sparrows), an exclusion zone of 75 feet will be established to protect the nesting riparian birds. If any listed or sensitive bird species are identified, CDFG must be notified prior to further action. Take of active bird nests is prohibited. {ISC-BIO}

- **TL – 6:** Construction or maintenance of sediment basins will occur between August 1 to October 15 in areas where water and sediment control basins create conditions that attract nesting birds and other wildlife.

- **TL – 7:** To protect California red-legged frog (CRLF), all construction within stream channels will take place during daylight hours. {ISC-BIO}

- **TL – 8:** If suitable habitat is present, project activities will begin after July 1 to avoid impacts on breeding CRLF or egg masses. {ISC-BIO}

- **TL – 9:** If habitat is known to occur and the absence of Northern spotted owl cannot be verified, RCD, NRCS, and/or PRNS will assume the species is present. Under these circumstances, RCD, NRCS, and/or PRNS will either 1) perform work after July 31 or 2) implement sound reduction measures to ensure that activities do not significantly raise noise above ambient levels. These measures can include, but are not limited to, laying a bed of sand before unloading gravel or rock from a truck and/or disabling "back-up beepers" on equipment. {ISC-BIO}

3. Requirements for Construction Site Management (CS)

The RCD, NRCS, and/or PRNS will ensure that adverse impacts do not occur during routine operations by implementing the following requirements for construction site management:

- **CS – 1:** Procedures for construction in sensitive environments will be employed; see also discussion in Limitations on Construction Equipment section below. These may include, but are not limited, to the following precautions and measures necessary to protect the environmental integrity of the site, as well as to protect all plants, animals, and aquatic life:

  - Access to the site will be thoroughly reviewed with the project engineer or inspector. Exact location of access way, number of trips planned, and type of vehicles used will be discussed. When possible, RCD, NRCS, PRNS, contractors, consultants, and project cooperators will use existing ingress or egress points. Placement of temporary access road, staging areas, and other facilities will avoid or limit disturbance to habitat and will be restored to pre-construction conditions.

  - Disturbance to existing grades and vegetation will be limited to the actual site of the conservation project and necessary access routes.

  - Trash, litter, construction debris, cigarette butts, etc., will be stored in a designated area approved by the inspector or removed from the site at the end of each working day. Upon completion of work, contractor is responsible for removing all of these unwanted items to the satisfaction of the project engineer and/or inspector.

  - All construction debris and sediments will be taken to appropriate landfills or, in the case of sediments, disposed of in upland areas or off site.

- No petroleum products, chemicals, silt, fine soils, and any substances deleterious to fish, amphibian, plant, or bird life will be allowed to pass into, or be placed where it can pass into the waters of the state.

- Contractor will have emergency spill clean up gear (spill containment and absorption materials) and fire equipment available on site at all times. These items are to be reviewed by the project inspector before construction begins.

- **CS – 2:** The use or storage of petroleum-powered equipment will be accomplished in a manner to prevent the potential release of petroleum materials into waters of the state (Fish and Game Code §5650). {ISC-HAZ} The following precautionary measures will be followed:

  - All vehicles and equipment on the site must not leak any type of hazardous materials such as oil, hydraulic fluid, or fuel. Vehicles and equipment must be inspected and approved by the inspector before use. Fueling will take place outside of the riparian corridor.

  - If needed, a contained area located at least 50 feet from a watercourse will be designated for equipment storage, short-term maintenance, and refueling. If possible, these activities will not take place on the project site.

  - Vehicles will be inspected for leaks and repaired immediately.

  - Leaks, drips, and other spill will be cleaned up immediately to avoid soil or groundwater contamination.

  - Major vehicle maintenance and washing will be done off site.

  - All spent fluids, including motor oil, radiator coolant, or other fluids, and used vehicle batteries will be collected, stored, and recycled as hazardous waste off site.

  - Dry cleanup methods (i.e., absorbent materials, cat litter, and/or rags) will be available on site.

  - Spilled dry materials will be swept up immediately

- **CS – 3:** Best management practices for construction period runoff and erosion control will be employed as described in Requirements for Erosion Control below.

4. Requirements for Erosion Control (EC)

Regulators require effective erosion control measures, including implementation and maintenance of projects in a manner that will avoid deposition of sediment into downstream areas, discharge of storm water that causes or contributes to a violation of water quality objectives, or activities that may result in increases in turbidity in the stream, as measured by Nephelometric Turbidity Units (NTU). The RCD, NRCS, and/or PRNS will ensure that adverse impacts from erosion and sediment releases do not occur during project activities by implementing the following:

- **EC – 1:** Best management practices for construction period runoff and erosion control will be employed. {ISC-GEO, ISC-HYD}

- **EC – 2:** Erosion control and sediment detention devices will be incorporated into the project design and implemented at the time of construction. These devices will be in place prior to October 15 for the purposes of minimizing fine sediment and sediment/water slurry input to flowing water and of detaining sediment-laden water on site. These devices will be placed at all locations where the likelihood of sediment input exists. Sediment collected in these devices will be disposed of away from the collection site and above the normal high water mark. These devices will be inspected regularly to ensure they are functioning properly.

- **EC – 3**: The project site will be restored to pre-construction condition or better. Disturbed areas will be revegetated prior to the onset of rain by live planting, native seed casting, or hydroseeding. See also Limitations on Construction Equipment, Earthmoving, and Vegetation Removal sections below.

- **EC – 4:** When implementing or maintaining a critical area planting above the high water line, a filter fabric fence, biodegradable fiber rolls, gravel bars, and/or hay bales will be utilized, if needed, to keep sediment from flowing into the adjacent waterbody. At the time vegetation is sufficiently mature to provide erosion control, it may be appropriate to remove the fence, fiber rolls and/or hay bales. Annual review by Marin RCD, NRCS, and/or PRNS will occur until the critical area planting is established to control erosion.

- **EC – 5:** Sediment removal from a stream channel or pond may occur if it will improve biological functioning of the stream and restore channel capacity. Measures to control upslope sediment sources will be implemented where feasible and access allows. {ISC-HYD}

- **EC – 6:** All debris, sediment, rubbish, vegetation, or other material removed from the channel banks, channel bottom, or sediment basins will be removed to a location where they will not re-enter the waters of the state. {ISC-HYD}

- **EC –** 7: Soil exposed as a result of construction and soil above rock riprap will be revegetated using native seed casting or by hydroseeding prior to the onset of rain. In general, interstitial spaces between rocks will be planted with riparian vegetation such as willows rather than hydroseeded.

- **EC – 8:** Discharge of decant water from any on-site temporary sediment stockpile or storage areas or any other discharge of construction dewatering flows to surface waters, except as described in Limitations to Work in Streams and Permanently Ponded Areas below, outside of the active dredging site is prohibited. {ISC-HYD}

- **EC – 9**: When requested by CDFG or NOAA Fisheries, the RCD, NRCS, and/or PRNS will inspect in-stream habitat and performance of sediment control devices at least once each day during construction to ensure the devices are functioning properly.

5. Limitations on Construction Equipment (CE)

The RCD and NRCS will ensure that adverse impacts do not occur during routine operations by implementing the following limitations on construction equipment:

- **CE – 1:** When possible, the RCD, NRCS, and/or PRNS will use existing ingress or egress points, and work will be performed from the top of creek banks.
- **CE – 2:** A permit application for any work done with equipment in a creek will include a detailed description of the planned use of the equipment, including type of equipment, ingress and egress points, duration of time in creek, specific activities to be accomplished with equipment, and measures to be employed to minimize impacts on streambed and bank and riparian vegetation.
- **CE – 3:** When heavy equipment is used, woody debris and vegetation on banks and in the channel will not be disturbed if outside of the project's scope.
- **CE – 4:** The amount of time heavy equipment is stationed, working, or traveling within the creek bed will be minimized. {ISC-HAZ}
- **CE – 5:** Use of heavy equipment will be avoided in a channel bottom with rocky or cobbled substrate. If access to the work site requires heavy equipment to travel on a rocky or cobbled substrate, a rubber tire loader/backhoe is the preferred vehicle. Only after this option has been determined impossible or less environmentally protective will the use of tracked vehicles be considered.
- **CE – 6:** Heavy equipment will not be used in a flowing stream, creek, or ponded area, except to cross a stream or pond to access the work site.
- **CE – 7:** Equipment will only be allowed in Lagunitas and Olema Creeks and other sensitive creek habitats under special circumstances (to be determined by the RWQCB and CDFG during project review).
- **CE – 8:** If suitable habitat for listed butterflies exists at the project site or if a host plant is found, project work will be carried out with minimum soil compaction. Wherever possible, work will be performed with hand tools. {ISC-BIO}

6. Limitations on Earthmoving (EM)

The RCD, NRCS, and/or PRNS will ensure that adverse impacts do not occur during routine operations by implementing the following limitations on earthmoving:

- **EM – 1:** Finished grades will not exceed 2:1 side slopes.
- **EM – 2:** Excavated material not used in the implementation of the practice will be removed out of the 100-year flood plain.
- **EM – 3:** Placement of temporary access roads, staging areas, and other facilities will avoid or limit disturbance to habitat and will be restored to pre-construction conditions.

- **EM –** 4: Road improvement projects will be modeled on the "Handbook for Forest and Ranch Roads: A Guide for planning, designing, constructing, reconstructing, maintaining and closing wildland roads," by William Weaver and Danny Hagans.

- **EM – 5**: If the substrate of a seasonal pond, creek, stream or waterbody is altered during work activities, it will be returned to approximate pre-construction conditions after the work is completed, unless the RCD, NRCS, and/or PRNS and NOAA Fisheries and/or CDFG determine that other measures should be implemented.

- **EM – 6:** No work will occur in areas of known human remains. In the event of inadvertent discovery, all work will stop in the immediate vicinity of the discovered remains. The County Coroner and a qualified archaeologist will be notified immediately so that an evaluation can be performed. If the remains are deemed to be Native American and prehistoric, the Native American Heritage Commission will be contacted by the Coroner so that a "Most Likely Descendant" can be designated. Work will cease until the "Most Likely Descendant" has time to propose a mutually acceptable disposition for the remains to the landowner. {ISC-CUL}

- **EM –** 7: Overhanging banks within potential California freshwater shrimp habitat will remain undisturbed. {ISC-BIO}

7. Limitations on Use of Rock and Other Hard Structures (RU)

The RCD, NRCS, and/or PRNS will ensure that adverse impacts do not occur during routine operations by implementing the following limitations on use of rock and other hard structures:

- **RU – 1:** Biotechnical approaches will be used for streambank protection. Only in unusual circumstances will non-biotechnical methods be approved by the program regulators. Incorporation of rock will be minimized and, if used at all, will need to be justified in order to secure regulatory approval for use in under this program.

- **RU – 2:** Riprap, rock, or other structural components used to prevent localized stream erosion, sediment transport, or movement will require conventional permitting and will not be included in the permit coordination program. However, rock used to facilitate natural stream processes and dynamics with the purpose of achieving stream equilibrium between erosional and depositional processes will be allowed under the permit coordination standards.

- **RU – 3:** Rock that is used solely for the prevention or interference with natural stream functions is classified as a stream channel hardening project and is not included in the permit coordination program. Rock used to support a defensible stream restoration design slope to create balance between the valley slope, sinuosity, and channel slope, and rock used to support habitat requirements of aquatic and terrestrial fauna are classified as restoration projects and authorized under the permit coordination program.

- **RU – 4:** No gabions, grouted rock, or concrete will be used in any waterway (fish-bearing or non fish-bearing) for grade stabilization, stream channel stabilization, streambank protection, or stream improvement projects.

- **RU – 5:** Use of concrete is allowed for repair of eroding spillways on existing sediment basins and water and sediment control basins. If used, all concrete will be allowed to cure for a minimum of 30 days before being exposed to stream water or water that may enter the stream, or all concrete will be coated with a CDFG-approved concrete sealant. If sealant is used, water will be excluded from the site until the sealant is dry.

- **RU – 6:** No rock structures will be constructed in channel bottoms that may interfere with freshwater shrimp migration between in-channel pools; this includes riprap for bank stabilization.

8. Limitations on Vegetation Removal and Replanting Requirements (VE)

The RCD, NRCS, and/or PRNS will ensure that adverse impacts do not occur during routine operations by implementing the following limitations on removal of plants and revegetation:

- **VE – 1:** No more than 0.10 acres of native riparian shrubs or woody perennials will be removed from a stream area. Where the area contains a mix of native and invasive species, up to 0.25 acres may be removed from a streambank or stream channel. If the area is exclusively nonnative plants, up to 5 acres of riparian vegetation may be removed, except in areas of lower Lagunitas Creek or other potential habitat for California freshwater shrimp. Any area cleared of vegetation must be revegetated with native plant species. Non-invasive, non-persistent grass species (e.g., barley grass) may be used in conjunction with native species to provide fast-establishing, temporary cover for erosion control. {ISC–BIO}

- **VE – 2:** The spread or introduction of exotic plant species will be avoided to the maximum extent possible by avoiding areas with established native vegetation during project activities, restoring disturbed areas with native species where appropriate, and performing post-project monitoring and control of exotic species.

- **VE – 3:** Removal of invasive exotic species is strongly recommended. Removal using hand tools, including chainsaws and weedwhackers, and hand pulling of exotics will be done in preparation for establishment of native plantings. To the extent possible, revegetation will be implemented at the same time removal of exotic vegetation occurs. If *Arundo donax* is removed, cuttings will be disposed of in a manner that will not allow reseeding to occur.

- **VE – 4:** Disturbance of native shrubs or woody perennials or removal of trees from streambanks or stream channels will be avoided or minimized; see further discussion in Discussion of Biological Resources Section b) Protection of Riparian Habitat and other Sensitive Natural Communities Initial Study Checklist below. {ISC-BIO} If native riparian vegetation will be disturbed, it will be replaced with similar native species.

- **VE – 5:** Except with approval from CDFG staff, there will be no cutting or removal of native trees 4” or greater diameter at breast height (dbh), except willows, for

which there will be no cutting or removal of trees 6" or greater dbh. Exotic trees that are causing habitat damage or hazardous situations may be removed with approval of the project biologist. Any exotic trees removed will be replaced with appropriate natives. For any permitted tree removal, the root structure will be left intact unless removal is authorized by CDFG staff. {ISC-BIO}

- **VE – 6:** If native trees over 6" dbh are to be removed (with approval from CDFG), they will be replaced at a 3:1 ratio.
- **VE – 7:** Projects within potential California red-legged frog habitat will be designed to minimize disturbance to vegetation near or in permanent and seasonal pools of streams, marshes, ponds, or shorelines with extensive emergent or weedy vegetation. {ISC-BIO}
- **VE – 8:** Project activities in areas of potential California freshwater shrimp habitat will avoid removal of or damage to overhanging vegetation along stream channels.
- **VE – 9:** Hand labor will be used to trim vegetation within the channel or on the bank. Handheld equipment such a weedwhackers and chainsaws are authorized.
- **VE – 10:** Native plants characteristic of the local habitat type will be the preferred alternative when implementing and maintaining the practices in natural areas. When specified, as required by the regulatory agencies, only native plant species will be used. Under special circumstances, regulators may allow for the use of non-invasive, non-persistent grass species.
- **VE – 11:** All areas disturbed by the project or in which vegetation was removed will be restored to a natural state with native trees, shrubs, and/or grasses. Barren areas will typically be planted with a combination of willow stakes, native shrubs, and trees and/or erosion control grass mixes.
- **VE – 12:** For projects that have removed native vegetation, post-construction revegetation success will be equivalent to or better than the pre-project conditions. If, after 5 years, that level of success has not been achieved, the RCD, NRCS, and/or PRNS will consult with CDFG to develop and implement measures to achieve success.
- **VE – 13:** If needed, an irrigation system will be installed to ensure establishment of vegetation; when vegetation is sufficiently established, irrigation materials will be removed.
- **VE – 14:** The project area will be restored to pre-construction conditions or better.
- **VE – 15:** If the project area supports listed plant species, the plants will not be disturbed. A buffer zone of 20 feet will be established around the plants to avoid impacts. {ISC-BIO}
- **VE – 16:** Host plants of listed butterflies, broadleaf stonecrop and *Viola adunca*, will be protected with the same 20-foot buffer zone as listed plants. {ISC-BIO}

9. Limitations on Use of Pesticides, Herbicides, and Fertilizers (PH)

The RCD, NRCS, and/or PRNS will ensure that adverse impacts do not occur during routine operations by implementing the following limitations on use of pesticides, herbicides, and fertilizers:

- **PH – 1:** No pesticides, with the exception of herbicide application as described below to control established stands of exotics or to control the invasion of exotics into restoration plantings, will be used as part of the permit coordination program.

- **PH – 2:** In general, hand labor will be used to control exotic vegetation at the site. Under extreme circumstances and with regulatory approval, herbicides may be applied to control established stands of nonnative species. {ISC-HAZ}

- **PH – 3:** Where it is necessary to use herbicides to control established stands of exotics or to control the invasion of exotics into restoration plantings, application will be compliant with the California Department of Pesticide Use regulations in accordance with Material Safety Data Sheets, the Marin County Agriculture Commission's Weed Management Plan, manufacturer's instructions, and/or the guidance of a registered pesticide advisor. Herbicides must be applied directly to plants and may not be spread upon any water or where they can leach into waterways in subsequent rains. Application will occur in a manner that minimizes drip and drift into the water and only on calm days (wind less than 5 miles per hour) to prevent airborne transfer of herbicide. {ISC-HAZ}

- **PH – 4:** In riparian environments, an herbicide (without a surfactant) that has been registered for use in an aquatic environment (e.g., Aquamaster™) and on target vegetation will be utilized. No broadcast spraying will occur. Great care will be taken to avoid contact with native species. {ISC-HAZ}

- **PH – 5:** On NPS lands, herbicides will be applied using backpack sprayers in compliance with National Park Service Integrated Pest Management regulations and California Department of Pesticide Use regulations in accordance with Material Safety Data Sheets. No foliar spraying is allowed in riparian habitats. Any proposed herbicide ground spraying within 100 feet of a creek is not included in the permit coordination program. During the dry season (July 1 to November 15), select stumps of nonnative trees and shrubs within riparian zones may be treated by painting herbicides. {ISC-HAZ}

- **PH – 6:** No pesticides, herbicides, or fertilizers will be used where threatened or endangered species occur. {ISC-HAZ}

- **PH – 7:** Where habitat for listed butterflies occurs, no pesticides, herbicides, or fertilizers will be used. {ISC-BIO}

- **PH – 8:** No fertilizers will be used within the 20-foot buffer zone around a listed plant. {ISC-BIO}

- **PH – 9:** Organic amendments may be used to ensure successful establishment of restoration vegetation associated with the practices. Organic fertilizers may be used above the normal high water mark the year of planting, if necessary. No chemical fertilizers will be used. {ISC-HAZ}

- **PH – 10:** No chemically treated timbers will be used on in-stream structures.

10. Limitations on Work in Streams and Permanently Ponded Areas (SP)

The RCD, NRCS, and/or PRNS will ensure that adverse impacts do not occur during routine operations by implementing the following limitations on work in streams and permanently ponded areas:

- **SP – 1:** In specific cases where it is deemed necessary to work in a flowing stream/creek, the work area will be isolated, and all flowing water will be temporarily diverted around the work site to maintain downstream flows during construction. A qualified biologist will prepare a species protection and dewatering plan and be present for all dewatering and rewatering events. The plan will be prepared with guidance from NOAA Fisheries and/or CDFG. When construction is completed, the flow diversion structure will be removed in a manner that will allow flow to resume with the least disturbance to the substrate and water quality. {ISC-BIO}

- **SP – 2:** No activities will be conducted in channels with flowing or standing water within potential California freshwater shrimp habitat.

11. Specific Requirements for Protection of Listed Species (LS)

In addition to the limitations set forth in the previous sections, the following measures will be employed to protect listed species:

- **LS – 1:** Construction and maintenance of any practice that results in a permanent adverse change in flow in streams that support a fishery are not permitted under this program. Projects seeking to implement conservation practices in those circumstances must seek individual permits from appropriate public agencies.

- **LS – 2:** Marin RCD, NRCS, and/or PRNS will meet with NOAA Fisheries, CDFG, and other regulators in the spring of each year to review the individual projects. The purpose of this meeting is to determine if take is likely to occur. Regulators may provide additional conditions on the projects where take may occur. Such conditions will be included in a memo from the RCD, NRCS, and/or PRNS to the agencies, to be confirmed in writing within 60 days. Marin RCD, NRCS, and/or PRNS will include those conditions as part of the project plan and contracts with the cooperator.

- **LS – 3:** RCD, NRCS, and/or PRNS staff will conduct reconnaissance-level surveys of each project site to identify potential habitat for listed species. When Marin RCD, NRCS, and/or PRNS staff identify an area of possible concern, reconnaissance-level surveys will be followed by site evaluations by qualified biologists or botanists as appropriate.

- **LS – 4:** If unforeseen circumstances arise in project implementation that may lead to adverse effects on listed species or their habitat, operations will cease immediately and the appropriate resource agencies, USFWS, NOAA Fisheries, and/or CDFG will be contacted.

- **LS – 5:** If larval host and nectar plants for listed butterflies are present, a qualified biologist will perform surveys according to USFWS protocols to determine presence or absence of the butterflies.

- **LS – 6:** If Myrtle's silverspot or San Bruno elfin butterfly are observed during pre-construction surveys, USFWS will be contacted before work activities begin for technical assistance and determination if additional protection measures are needed.

- **LS – 7:** If presence of Myrtle's silverspot or San Bruno elfin butterfly are confirmed, alterations to existing habitat conditions will be evaluated by a qualified ecologist to determine the effect of such changes on the butterfly population prior to construction (i.e., hydrologic changes of the soil, alteration of grazing regimes, and revegetation).

- **LS – 8:** If the project site occurs in potential CRLF habitat, a qualified biologist approved by USFWS will conduct a pre-construction survey no more than 48 hours before the start of construction activities. The biologist will look for species, evaluate the likelihood of usage, and determine if additional biological monitoring is needed during construction to ensure that individuals present will be removed or avoided.

- **LS – 9:** If CRLF are observed during pre-construction inspections, USFWS will be contacted before work activities begin for technical assistance, determination if additional protection measures are needed, and assistance in selecting locations for suitable release sites up- or downstream of the project site.

- **LS – 10:** If CRLF are observed in the work area, the USFWS-approved biologist will have the authority to halt work until they can be moved out of the project area. Translocation of CRLF will be performed only by individuals approved in advance by USFWS and with the necessary permits.

MONITORING AND REPORTING PROGRAM

A *Riparian Zone Monitoring Plan* (RZMP; Appendix 1 herein) has been developed by UCCE for Marin RCD's PCP conservation projects that are implemented in riparian areas targeted in watershed recovery efforts to control erosion and sedimentation; increase aquatic, riparian, and upland habitat; and stabilize eroding stream channels. The RZMP applies to any stream improvement project from headwater creeks or gullies to large streams or small rivers. Overall, the RZMP provides a science-based guide to organize post-project monitoring based on site-specific objectives developed during project planning to further understand agricultural sustainability and ecosystem services. It standardizes monitoring protocols and prioritizes questions for periodic evaluation. Consistent and systematic monitoring of project outcomes will continue to improve conservation practices while maintaining landowner confidentiality. (UCCE 2010)

Monitoring under the RZMP has three purposes: to assess landowner value from the program, to provide reporting information to funders and regulators, and to evaluate the practices and program for future planning. Monitoring for the Marin Coastal Watershed Permit Coordination Program has three components:

1. *Implementation* monitoring that verifies the project is conducted as per project plans and program conditions;

2. *Effectiveness* monitoring that verifies that the implemented practices are performing as expected; and

3. *Validation* monitoring that confirms whether or not practices are having the intended biological (i.e., habitat use) or physical (i.e., water quality/quantity) effects.

Each of these monitoring components has pre-project and post-project elements. Implementation monitoring also has elements that occur during project construction.

Pre- and During Construction Monitoring, Notification, and Reporting

Preconstruction planning of individual projects will include establishing clearly defined objectives; a Project Objectives & Targets worksheet is included in Appendix A of the RZMP (Appendix 1 herein). Once project objectives are determined, a Monitoring Plan Checklist will be developed to guide the project-specific monitoring for each site; see Appendix A in the RZMP. This checklist may include all three components discussed above—implementation, effectiveness, and validation monitoring.

As part of MRCD's annual planning, the eligibility of potential projects for inclusion in the permit coordination program will be verified using the Project-specific CEQA Compliance Checklist contained in Appendix 2 herein. The steps outlined in the checklist will also be used to ensure potential impacts are fully assessed. Objectives will be agreed upon with the landowner and potential resource issues will be identified. If required, on-site assessments will be performed to document baseline conditions, and recommendations for protective measures will be developed. Regulators will be contacted to receive guidance prior to finalization of designs, and all permit conditions will be included in the Cooperator Agreement and the construction contract documents.

During implementation, inspections will be conducted to ensure on-site compliance with all permit requirements. Procedures for complying with permits and to address non-compliance with permits conditions are discussed in the Permitting Mechanisms for Individual Projects section above. If special-status species are likely to be present, the RCD, NRCS, and/or PRNS, in consultation with the USFWS and/or NOAA Fisheries, will determine the qualifications for the monitor and the requirements for work in the sensitive resource area.

Post-construction Monitoring, Notification, and Reporting

Qualitative Monitoring

Qualitative monitoring will be used to verify appropriate implementation and project effectiveness. It will confirm whether or not the project was constructed per project plans and program conditions and if the practices are performing as expected. This information will be used to provide post-implementation reports to funders and regulators.

Qualitative effectiveness monitoring will use the Project Assessment Checklist to rapidly characterize the success of each project; see Appendix B in the RZMP. The checklist uses visual assessments of practices implemented, including fences, troughs & springs, roads, plantings, grazing, erosion control, and in-stream habitat. RCD, NRCS, and/or

PRNS staff will also establish photo-monitoring points and take pre-, during, and post-project photos. All sites will be inspected at least twice during the first rainy season after installation. Each site will also be inspected once at the end of the rainy season for the first 5 years following construction or as required by the regulatory agencies.

As part of their Cooperator Agreement, landowners agree to maintain their projects for a period of at least 10 years. Landowner assessments will include a post-project implementation questionnaire and ongoing assessments of project function; see Landowner Questionnaire in Appendix B in the RZMP. Qualitative landowner/operator assessments will assist with confirming whether practices are having the intended environmental effects.

Quantitative Effectiveness and Validation Monitoring

Twenty-five percent of riparian enhancement projects will include quantitative effectiveness and validation monitoring. Quantitative effectiveness monitoring will allow objective statistical verification of the qualitative monitoring being performed for every project. Validation monitoring will determine whether projects are achieving the long-range ecological results. Both quantitative effectiveness monitoring and validation monitoring require baseline data gathered in pre-project planning assessments. Together they will enable the Marin RCD and project partners to evaluate and improve the Marin Coastal Watershed Permit Coordination Program.

In order to ensure that implemented practices are functioning as planned, quantitative effectiveness monitoring will include measurements of:

- Sediment load;
- Streambank stability;
- Groundcover and residual dry matter as a proxy for reduced pathogen/nutrient load;
- Riparian cover;
- Riparian species richness;
- In-stream shelter;
- Stream channel shade;
- Large woody debris;
- Pool depth; and
- Bankfull width-to-depth ratio.

To assess whether projects are having the intended long-range ecological effects, validation monitoring is conducted by RCD partners and includes, depending on project objectives:

- Terrestrial species abundance and species richness;
- Native fish/amphibian/shrimp presence, density and species richness; and
- Water quality/ quantity

Monitoring Report Requirements

Under the PCP, the Marin RCD, NRCS, and/or PRNS will provide written notification of the status of all projects to permitting and funding agencies in the form of a annual post-

construction report due January 31 of each year after project completion for the required duration of monitoring. The report will list participating landowners and describe each project objective, area affected, natural biological enhancements, monitoring protocols conducted, and cut/fill volumes and slope of work. It will discuss conservation benefits, quantify gains in wetlands and riparian areas, and provide photo documentation of before and current site conditions. Photo-documentation will occur from photo points before construction and annually thereafter throughout the term of the monitoring program and will include both close-up and long-range shots.

INITIAL STUDY CHECKLIST

This checklist identifies physical, biological, social, and economic factors that might be affected by the proposed project. Clarifying/explanatory discussion is included following the applicable section of the checklist. The questions in this form are intended to encourage the thoughtful assessment of impacts and do not represent thresholds of significance; however, where relevant thresholds have been established by statewide regulatory agencies, those thresholds are included in the clarifying discussion.

Aesthetics

	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
I. Aesthetics: Would the project:				
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☒	☐
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☒
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☐	☐	☒
d) Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?	☐	☐	☐	☒

Discussion:

The program area is located in agricultural western Marin County, an area with high aesthetic value and numerous scenic vistas. The program will improve area aesthetics by enhancing and restoring native California vegetation along riparian corridors and wetlands at project sites. Short-term impacts on the scenic vista and visual character of project sites that may occur during construction of conservation and restoration projects will be immediately mitigated by installation of native vegetation and grasses in disturbed areas. When completed, the restoration and conservation projects will result in improved area aesthetics.

a) Degrade a scenic vista: **less-than-significant impact**

Generally, implementation of specific practices will not be visible from areas with public access. However, some projects conducted under the program may be visible during construction. This will not comprise a major portion of the view and will promptly be restored as described above to better than pre-project conditions.

b) Damage scenic resources within a state scenic highway: **no impact**

Although Highway 1 through the project area is eligible to be a State Scenic Highway, it has not been designated, and no other scenic highways exist in the project area (California Department of Transportation 2010). Because no long-term impacts on scenic resources will result from the program, even if Highway 1 is designated as a scenic highway in the future, the program will not cause significant impacts on its scenic character.

c) Degrade the existing visual character of the site: **no impact**

By helping maintain the sustainability of agriculture in western Marin County, the program will help preserve the scenic character of the program area. As described in a) above, construction impacts may occasionally create minor, temporary impacts on the visual aesthetics of the area. However, minor construction is compatible with the visual character of a working agricultural landscape.

d) Create light or glare that would degrade a nighttime view: **no impact**

The project work will be carried out during the day. No additional lighting or glare will be produced.

Agriculture and Forest Resources

	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
II. Agriculture and Forest Resources: Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☒	☐
b) Conflict with existing zoning for agricultural use or a Williamson Act contract?	☐	☐	☐	☒
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in PRC §12220(g)), timberland (PRC §4526), or timberland zoned Timberland Production (Government Code §51104(g))?	☐	☐	☐	☒

	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
II. Agriculture and Forest Resources: Would the project:				
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e) Involve other changes in the existing environment that, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☒	☐

Discussion:

a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), . . .to non-agricultural use: **less-than-significant impact**.

Very small amounts of Unique Farmland and Farmland of Statewide Importance occur in Marin County (less than 900 acres), of which about half may occur within the program area. One goal of the program is to support agricultural sustainability. Projects are designed to preserve agricultural land so the program will likely help keep important farmland areas in agricultural use. In some cases, very small amounts of agricultural land, along the edge of stream channels, are laid back and converted to riparian vegetation. This change will help to preserve remaining land that was otherwise subject to loss through erosion.

b) Conflict with existing zoning for agricultural use or a Williamson Act contract: **no impact**.

Implementation of the program is fully compatible with agricultural uses. Implementation of the conservation practices will not adversely impact agricultural values and will not result in a substantial alteration in the present or planned land use of the area or a reduction in the acres devoted to agriculture. One purpose of the project is to improve agricultural sustainability and operations in the watersheds through stabilization of eroding soils and control of sediment discharges from agricultural land to watercourses.

c) & d) Conflict with existing zoning for, or cause rezoning of, forest land timberland, or cause loss of forest: **no impact.**

The program will neither conflict with existing zoning nor cause any reduction of existing forest.

e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use: **less-than-significant impact.**

Much of the project area is characterized as farmland of local importance or grazing land. Where restoration projects call for stabilizing streambanks by laying back the bank and planting riparian vegetation, some small amounts of agricultural and grazing land may be lost. The individual rancher or farmer will have a choice about whether to implement these measures, thus allowing them to make the choices that enhance the overall viability of their particular agricultural operation.

Air Quality

	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
III. Air Quality: Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☐	☒
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☐	☐	☐	☒
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non- attainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors)?	☐	☐	☒	☐
d) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☐	☒
e) Create objectionable odors affecting a substantial number of people?	☐	☐	☐	☒

The program will not create any sustained source of air pollution as construction will temporarily produce only very small amounts of air pollutants. Construction equipment typically produces carbon monoxide, nitrogen oxides, and sulfur oxides; these chemicals in turn produce ozone. Construction equipment also emits particulate matter, although the majority of coarse particulate matter emitted from construction is a result of creating dust. Particulate matter is measured as particles less than 10 microns wide (PM10) and particles less than 2.5 microns wide (PM2.5). Together ozone, carbon monoxide, nitrogen oxides, sulfur oxides, particulate matter as PM2.5 and PM10, and lead comprise a set of “Criteria Pollutants” identified in the Clean Air Act. Except for lead,

these pollutants are common and widespread. The most serious health concerns are the result of ozone and particulate matter (EPA 2010).

a) Conflict with or obstruct the implementation of any air quality plan: **no impact.**

The projects are located within the jurisdiction of the Bay Area Air Quality District (BAAQMD). Because the Bay Area met the national standard for PM10 (although not the state standard), no implementation plan is required or produced. The 2000 Clean Air Plan identifies 14 measures to reduce ozone, none of which apply to small-scale construction projects. BAAQMD is in the process of producing a new clean air plan. Marin RCD staff will review the plan when complete to ensure that the program complies with all measures. It is not anticipated that anything in the program will conflict with air quality plan measures or implementation.

b) Violate any air quality standard or contribute to an existing violation: **no impact**.

The federal and state governments have set standards for ambient air quality. Monitoring is performed at a variety of locations to check whether those standards are attained. Criteria pollutants include ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, sulfates, lead, and fine and coarse particulate matter. When the measured pollutant is less than the allowable limit, the area is defined as being “attainment” for that compound. BAAQMD has numerous monitoring stations across the Bay Area. Many pollutants are measured at every station, but some are measured at only a few. In Marin County, criteria pollutants are measured at a monitoring station located in San Rafael. The San Rafael station measures ozone, carbon monoxide, nitrogen dioxide, and coarse particulate matter as PM10 (BAAQMD 2008).

The Bay Area is nonattainment for both ozone and PM10 and attainment for carbon monoxide and nitrogen dioxide, as shown in Table 3 (BAAQMD 2010). Marin County air quality, as measured at the San Rafael monitoring station in east Marin, is below air quality limits for all criteria pollutants. The west Marin County area is likely to have cleaner air than east Marin because the predominant air flow is off the ocean and because west Marin has less vehicle traffic than east Marin.

Table 3. Existing Air Quality

(measured in San Rafael)

Criteria Pollutant	National Attainment Standard	California Attainment Standard	Bay Area Status	Max.	Annual (or 3-year) Average
Ozone (1 hour-ppb)	---	90	N	85	---
Ozone (8 hour-ppb)	70	75	N	69	50
Carbon Monoxide (1 hour-ppm)	35	20	A	1.8	---
Carbon Monoxide (8 hour-ppm)	9	9	A	1.1	---
Nitrogen Dioxide (1 hour-ppb)	100/53	180/30	A	56	13
Coarse Particulate Matter as PM10 (24-hour-$\mu g/m^3$)	150	50/20	N	41	18.6

The project will generate limited emissions from construction. There will be about 5-10 projects a year, disturbing areas of less than an acre and lasting 1 to 6 weeks. The

emissions generated by such small-scale construction will be inconsequential, even in comparison to the clean air setting of the project. Limited emissions in a clean air setting will not cause or contribute to any air quality violations.

c) Result in cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment: **less-than-significant impact**.

The project will produce small amounts of coarse particulate matter, which is non-attainment under state standards although it meets the national standards. Coarse particulate matter may be composed of particles of soot, dust, smoke, fumes, and aerosols in either solid or liquid form. For this project, sources of coarse particulate matter are diesel fumes and air-borne dust.

BAAQMD notes that the largest PM10 concentrations occur in winter, and result from a combination of more fuel wood burning, higher conversion of nitrogen oxides into particulate matter in winter weather conditions, and increased build-up of pollutants near ground level because of winter air flow patterns (BAAQMD 2000). Because program construction is limited to the dry season in summer, emissions will be generated at a non-peak time. This, in combination with best management used to keep air-borne dust to a minimum and the small scale of the construction will keep program PM10 emissions less than cumulatively significant.

In 2004, the Bay Area was designated as marginal nonattainment for ozone, which means that, as a whole, the Bay Area is close to achieving air quality standards. In Marin, standards are already being met, and, as described above, west Marin is likely to be even lower. Unlike PM10, ozone forms more in summer when nitrogen oxides, carbon monoxide, and volatile organic compounds (collectively known as ozone precursors) react with sunlight. For small, isolated construction projects occurring in clean air, there is unlikely to be any significant concentration of ozone formed. Therefore, the program will not make a cumulatively considerable contribution to ozone levels.

d) Expose sensitive receptors to substantial pollutant concentrations: **no impact**.

All of the project sites are on private land. None of them is close to sensitive receptors, such as hospitals or schools. The project will not generate substantial pollution concentrations.

e) Create objectionable odors affecting a substantial number of people: **no impact.**

The projects will not create objectionable odors. Although construction equipment may generate odors, construction will generally occur on private land, well away from public access. It is extremely unlikely that construction odors will even be noticed by anyone not associated with the project.

Biological Resources

	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
IV. Biological Resources: Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by CDFG or USFWS?	☐	☐	☒	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by CDFG or USFWS?	☐	☐	☒	☐
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☒	☐
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☒	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒

	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
IV. Biological Resources: Would the project:				
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒

Discussion:

Implementation and maintenance of the conservation practices may result in temporary and minor impacts on biological resources. Project activities that have potential to result in short-term impacts include soil excavation, grading, preparation of the ground for seeding and mulching, grade and stream stabilization, channel excavation, construction of earthen embankments, placement of fill, vegetation removal, herbicide application, and burial, trampling or crushing of vegetation from equipment and foot traffic. In certain cases, limited mortality of individual plants or animals may occur after consultation with and approval from the appropriate regulatory agencies.

Avoidance measures are included below that will ensure that potential disturbances to biological resources result in less-than-significant impacts. On a long-term basis, all practices provide for improved aquatic, riparian, and/or upland habitat and decreased sedimentation in waterbodies to benefit fish, amphibians, reptiles, resident and migratory birds, and many other species. For example, the stream channel stabilization practice will result in an increased number of deep pools that aquatic animals, including California red-legged frogs and salmonids, require to survive the long, dry California summers. Practices that enhance riparian vegetation and development of habitat values, including critical area planting, filter strips, fish stream improvement, stream channel stabilization, and streambank protection, will provide shelter from predators and breeding, rearing, foraging, and basking sites for special status species known to occur in the watersheds.

Control of erosion and polluted runoff will improve the quantity and quality of freshwater input into the creeks, streams, and ponds. Removal and control of nonnative plant species will reduce the extent to which exotics invade habitat and displace native flora. The net biological benefits that will result from implementation and maintenance of the conservation practices for species include high quality aquatic, riparian, and upland habitat values, reduced habitat fragmentation and increased connectivity, maintaining or increasing species populations, and buffering sensitive areas.

a) <u>Impacts on species identified as a candidate, sensitive, or special status species</u>: **less-than-significant impact.**

Special-status species with potential to occur in the program area are listed in Table 4. Discussion of species-specific requirements measures to avoid or minimize impacts on protected species follows.

Table 4: Special-status Species with Potential to Occur in the Marin Coastal Watersheds Program Area

Table 4A: Listed Animals				
Common Name	Scientific Name	Federal Listing	State Listing	Other Conservation Status
Aquatic Species				
steelhead	*Oncorhynchus mykiss*	T	--	--
coho salmon	*O. kisutch*	E	E	--
Chinook salmon	*O. tshawytscha*	T		
California red-legged frog	*Rana draytonii*	T	--	SSC
California freshwater shrimp	*Syncaris pacifica*	E	E	--
tidewater goby*	*Eucyclogobius newberryi*	E	--	SSC
California tiger salamander*	*Ambystoma californiense*	E[1]	T	SSC
Terrestrial Species				
San Bruno elfin butterfly	*Callophrys mossii bayensis*	E	--	--
Myrtle's silverspot	*Speyeria zerene myrtleae*	E	--	--
Northern spotted owl	*Strix occidentalis caurina*	T	–	–
western snowy plover*	*Charadrius alexandrinus nivosus*	T	--	SSC
California clapper rail*	*Rallus longirostris obsoletus*	E	E	--
California black rail*	*Laterallus jamaicensis coturniculus*	--	T	FP

Note: Species data from the California Natural Diversity Database, retrieved July 2010. Habitat associations for animals are from the California Wildlife Habitat Relationship Database. Habitat associations for plants are from the California Native Plant Society Inventory of Rare and Endangered Vascular Plants.

These species occur in the overall program area, but habitats in which they occur are specifically excluded from the program. (See **Areas not Included in the Program.)*

Abbreviations used in the tables: E-endangered, T-threatened, R-rare, FP-State of California fully-protected species, SSC- California species of special concern

[1] Across its range, California tiger salamander is federally listed as threatened. However, the Santa Rosa Plain DPS and Santa Barbara DPS are listed as endangered.

Table 4B: Listed Plants

Common Name	Scientific Name	Federal Listing	State Listing	Other Conservation Status
Baker's larkspur	*Delphinium bakeri*	E	E	CNPS1B.1
beach layia*	*Layia carnosa*	E	E	CNPS 1B.1
Sonoma spineflower	*Chorizanthe valida*	E	E	CNPS 1B.1
Tiburon jewelflower	*Streptanthus niger*	E	E	CNPS 1B.1
Tidestrom's lupine	*Lupinus tidestromii*	E	E	CNPS 1B.1
white-rayed pentachaeta	*Pentachaeta bellidiflora*	E	E	CNPS 1B.1
Tiburon paintbrush	*Castilleja affins ssp. neglecta*	E	T	CNPS 1B.2
golden larkspur	*Delphinium luteum*	E	R	CNPS 1B.1
soft bird's-beak	*Cordylanthus mollis ssp. Mollis*	E	R	CNPS 1B.2
Contra Costa goldfields	*Lasthenia conjugens*	E	--	CNPS 1B.1
robust spineflower	*Chorizanthe robusta var. robusta*	E	--	CNPS 1B.1
showy rancheria clover	*Trifolium amoenum*	E	--	CNPS 1B.1
Sonoma alopecurus	*Alopecurus aequalis var. sonomomensis*	E	--	CNPS 1B.1
Santa Cruz tarplant	*Holocarpha macradenia*	T	E	CNPS 1B.1
Marin western flax	*Hesperolinon congestum*	T	T	CNPS 1B.1
Tiburon mariposa-lily	*Calochortus tiburonensis*	T	T	CNPS 1B.1
Point Reyes meadowfoam	*Limnanthes douglasii*	--	E	CNPS 1B.1
North coast semaphore grass	*Pleuropogon hooverianus*	--	T	CNPS 1B.1
Mason's lilaeopsis	*Lilaeopsis masonii*	--	R	CNPS 1B.1
Mason's ceanothus	*Ceanothus masonii*	--	R	CNPS 1B.2
Point Reyes blennosperma	*Blennosperma nanum var. robustum*	--	R	CNPS 1B.2

Table 4C: Other Special-status Animals

Common Name	Scientific Name	Conservation Status	Habitat Types
A leaf-cutter bee	*Trachusa gummifera*	--	insufficient data
American badger	*Taxidea taxus*	SSC	wide variety
black swift	*Cypseloides niger*	SSC	barren cave
bumblebee scarab beetle	*Lichnanthe ursina*	--	coastal scrub, dunes
burrowing owl	*Athene cunicularia*	SSC	Annual grassland, coastal scrub, coastal terrace, prairie, perennial grassland
foothill yellow-legged frog	*Rana boylii*	SSC	Riverine, shoreline
globose dune beetle*	*Coelus globosus*	--	dunes
great blue heron	*Ardea herodias*	--	Freshwater emergent wetland, pasture, saline emergent wetland, shoreline, valley-foothill riparian
great egret	*Ardea alba*	--	Freshwater emergent wetland, irrigated row and field crops, pasture, saline emergent wetland, shoreline, valley-foothill riparian
hoary bat	*Lasiurus cinereus*	--	Klamath mixed conifer, montane riparian, Sierran mixed conifer
Marin elfin butterfly	*Callophrys mossii marinensis*	--	redwood
Marin hesperian	*Vespericola marinensis*	--	Annual grassland, coastal scrub, Douglas-fir, montane hardwood, montane hardwood-conifer
monarch butterfly	*Danaus plexippus*	--	Wide variety
northern harrier	*Circus cyaneus*	SSC	Wide variety

Table 4C: Other Special-status Animals

Common Name	Scientific Name	Conservation Status	Habitat Types
osprey	*Pandion haliaetus*	SSC	Wide variety
pallid bat	*Antrozous pallidus*	SSC	--
Peninsula coast range shoulderband	*Helminthoglypta nickliniana awania*	--	Coastal scrub
Point Reyes blue butterfly	*Plebejus icarioides parapheres*	--	--
Point Reyes jumping mouse	*Zapus trinotatus orarius*	SSC	Annual grassland, coastal scrub
Point Reyes mountain beaver	*Aplodontia rufa phaea*	SSC	Coastal scrub, montane hardwood-conifer, montane riparian
robust walker	*Pomatiopsis binneyi*	--	--
saltmarsh common yellowthroat*	*Geothlypis trichas sinuosa*	SSC	Saline emergent wetland
San Francisco forktail damselfly	*Ischnura gemina*	--	--
San Pablo song sparrow	*Melospiza melodia samuelis*	SSC	--
sandy beach tiger beetle*	*Cicindela hirticollis gravida*	--	Dunes, saline emergent wetland
silver-haired bat	*Lasionycteris noctivagans*	--	Klamath mixed conifer, montane riparian, pinyon-juniper, ponderosa pine, sierra mixed conifer, valley-foothill riparian
Tomales isopod	*Caecidotea tomalensis*	--	lacustrine
Tomales roach	*Lavinia symmetricus ssp. 2*	SSC	riverine

Table 4C: Other Special-status Animals

Common Name	Scientific Name	Conservation Status	Habitat Types
Townsend's big-eared bat	*Corynorhinus townsendii*	SSC	Wide variety
tricolored blackbird	*Agelaius tricolor*	SSC	Annual grassland, cropland, freshwater emergent wetland, pasture, perennial grassland
tufted puffin*	*Fratercula cirrhata*	SSC	Marine, offshore rocks
western pond turtle	*Emys marmorata*	SSC	Wide variety
western red bat	*Lasiurus blossevillii*	SSC	Blue-oak-foothill pine, jefferey pine, montane hardwood-conifer, montane riparian, orchard and vineyard
yellow warbler	*Dendroica petechia brewsteri*	SSC	Montane riparian, valley-foothill riparian

Table 4D: Other Special-status Plants

Common Name	Scientific Name	Conservation Status	Habitat type
blue coast gilia	*Gilia capitata ssp. chamissonis*	1B.1	Coastal dunes, coastal scrub
California beaked-rush	*Rhynchospora californica*	1B.1	Bogs and fens, lower montane coniferous forest, meadows and seeps, marshes and swamps
coast lily	*Lilium maritimum*	1B.1	Broad-leafed upland forest, closed-cone coniferous forest, coastal prairie, coastal scrub, freshwater marshes and swamps, North Coast coniferous forest
Kellogg's horkelia	*Horkelia cuneata ssp. sericea*	1B.1	Closed-cone coniferous forest, chaparral, coastal dunes, coastal scrub

Table 4D: Other Special-status Plants

Common Name	Scientific Name	Conservation Status	Habitat type
Marin checker lily	*Fritillaria lanceolata var. tristulis*	1B.1	Coastal bluff scrub, coastal prairie, coastal scrub
pink sand-verbena*	*Abronia umbellata ssp. breviflora*	1B.1	Coastal dunes
Point Reyes rein orchid	*Piperia elegans ssp. decurtata*	1B.1	Coastal bluff scrub
Raiche's red ribbons	*Clarkia concinna ssp. raichei*	1B.1	Coastal bluff scrub
rose leptosiphon	*Leptosiphon rosaceus*	1B.1	Coastal bluff scrub
woolly-headed gilia	*Gilia capitata ssp. tomentosa*	1B.1	Coastal bluff scrub
Baker's goldfields	*Lasthenia californica ssp. bakeri*	1B.2	Closed-cone coniferous forest, coastal scrub, meadows and seeps, marshes and swamps
bent-flowered fiddleneck	*Amsinckia lunaris*	1B.2	Coastal bluff scrub, cismontane woodland, valley and foothill grassland
Blasdale's bent grass	*Agrostis blasdalei*	1B.2	coastal bluff scrub, coastal dunes, coastal prairie
coastal bluff morning-glory	*Calystegia purpurata ssp. saxicola*	1B.2	Coastal dunes, coastal scrub, North Coast coniferous forest
coastal marsh milk-vetch	*Astragalus pycnostachyus var. pycnostachyus*	1B.2	Coastal dunes, coastal scrub salt marshes and swamps, streamsides
coastal triquetrella	*Triquetrella californica*	1B.2	Coastal bluff scrub, coastal scrub
dark-eyed gilia*	*Gilia millefoliata*	1B.2	Coastal dunes
fragrant fritillary	*Fritillaria liliacea*	1B.2	cismontane woodland, coastal prairie, coastal scrub, valley and foothill grassland

Table 4D: Other Special-status Plants

Common Name	Scientific Name	Conservation Status	Habitat type
Franciscan thistle	*Cirsium andrewsii*	1B.2	broad-leafed upland forest, coastal bluff scrub, coastal prairie, coastal scrub
Humboldt Bay owl's-clover*	*Castilleja ambigua ssp. humboldtiensis*	1B.2	Coastal salt marshes and swamps
Marin County navarretia	*Navarretia rosulata*	1B.2	closed-cone coniferous forest, serpentinite chaparral
Marin manzanita	*Arctostaphylos virgata*	1B.2	broad-leafed upland forest, closed-cone coniferous forest, chaparral, North Coast coniferous forest
marsh microseris	*Microseris paludosa*	1B.2	Closed-cone coniferous forest, cismontane woodland, coastal scrub, valley and foothill grassland
Mount Tamalpais bristly jewel-flower	*Streptanthus glandulosus ssp. pulchellus*	1B.2	Chaparral, valley and foothill grassland (serpentinite)
Mt. Tamalpais thistle	*Cirsium hydrophilum var. vaseyi*	1B.2	Broad-leafed upland forest, chaparral, meadows and seeps/serpentinite seeps
Napa false indigo	*Amorpha californica var. napensis*	1B.2	Broad-leafed upland forest, chaparral, cismontane woodland
North Coast phacelia	*Phacelia insularis var. continentis*	1B.2	coastal bluff scrub, coastal dunes
perennial goldfields	*Lasthenia californica ssp. macrantha*	1B.2	coastal bluff scrub, coastal dunes, coastal scrub
Point Reyes bird's-beak*	*Cordylanthus maritimus ssp. palustris*	1B.2	Coastal salt marshes and swamps
Point Reyes checkerbloom	*Sidalcea calycosa ssp. rhizomata*	1B.2	Freshwater marshes and swamps
Point Reyes horkelia	*Horkelia marinensis*	1B.2	Coastal dunes, coastal prairie, coastal scrub

Table 4D: Other Special-status Plants

Common Name	Scientific Name	Conservation Status	Habitat type
purple-stemmed checkerbloom	*Sidalcea malviflora ssp. purpurea*	1B.2	Broad-leaved upland forest, coastal prairie
San Francisco Bay spineflower	*Chorizanthe cuspidata var. cuspidata*	1B.2	Coastal dunes, coastal scrub, coastal prairie, coastal bluff scrub
San Francisco owl's-clover	*Triphysaria floribunda*	1B.2	Coastal prairie, coastal scrub, valley and foothill grassland (usually serpentinite)
Santa Cruz microseris	*Stebbinsoseris decipiens*	1B.2	Broad-leafed upland forest, closed-cone coniferous forest, chaparral, coastal prairie, coastal scrub, valley and foothill grassland
seaside tarplant	*Hemizonia congesta ssp. congesta*	1B.2	Valley and foothill grassland
short-leaved evax	*Hesperevax sparsiflora var. brevifolia*	1B.2	Coastal bluff, coastal dunes
supple daisy	*Erigeron supplex*	1B.2	Coastal bluff, coastal prairie
swamp harebell	*Campanula californica*	1B.2	bogs and fens, closed-cone coniferous forest, coastal prairie, meadows and seeps, freshwater marshes and swamps
Tamalpais lessingia	*Lessingia micradenia var. micradenia*	1B.2	Chaparral, valley and foothill grassland (usually serpentinite), roadsides
thin-lobed horkelia	*Horkelia tenuiloba*	1B.2	Broad-leaved upland forest, chaparral (mesic openings)
Tiburon buckwheat	*Eriogonum luteolum var. caninum*	1B.2	Chaparral, coastal prairie, valley and foothill garland (serpentinite)

Table 4D: Other Special-status Plants

Common Name	Scientific Name	Conservation Status	Habitat type
western leatherwood	*Dirca occidentalis*	1B.2	Broad-leaved upland forest, closed-cone coniferous forest, chaparral, cismontane woodland, north coast coniferous forest, riparian scrub, riparian woodland (mesic)
woolly-headed spineflower	*Chorizanthe cuspidata var. villosa*	1B.2	Coastal dunes, coastal prairie, coastal scrub
Koch's cord moss	*Entosthodon kochii*	1B.3	Cismontane woodland
Marin checkerbloom	*Sidalcea hickmanii ssp. viridis*	1B.3	Serpentinite chaparral
Mt. Tamalpais manzanita	*Arctostaphylos hookeri ssp. montana*	1B.3	Chaparral, valley and foothill grassland (serpentinite)
Mt. Vision ceanothus	*Ceanothus gloriosus var. porrectus*	1B.3	Closed-cone coniferous forest, coastal prairie, coastal scrub, valley and foothill grassland
Tamalpais jewel-flower	*Streptanthus batrachopus*	1B.3	Closed-cone coniferous forest, chaparral, serpentinite
Tamalpais oak	*Quercus parvula var. tamalpaisensis*	1B.3	Lower montane coniferous forest
Bolander's water-hemlock	*Cicuta maculata var. bolanderi*	2.1	Coastal marshes and swamps, fresh or brackish water
Thurber's reed grass	*Calamagrostis crassiglumis*	2.1	Coastal scrub, freshwater marshes and swamps
bristle-stalked sedge	*Carex leptalea*	2.2	Bogs and fens, meadows and seeps, marshes and swamps
Lyngbye's sedge	*Carex lyngbyei*	2.2	Marshes and swamps
Marin knotweed*	*Polygonum marinense*	3.1	Coastal salt or brackish marsh
thamnolia lichen	*Thamnolia vermicularis*		

Life History and Habitat Needs of Listed Species Known to Occur in the Action Area

Protected salmonids

Three species of protected salmonids occur in streams in the program area: Central California Coast ESU steelhead, Central California Coast ESU coho, and California Coast ESU Chinook. Population levels for the most prolific salmon watershed in the project area, Lagunitas Creek, are given below. In addition to the listed species, chum salmon have been recorded in Lagunitas Creek since 2001 (MMWD 2008). Occurrences of chum salmon are near the southern end of their current range. Chum occur from Alaska south with only very small remnant populations occurring in California and Oregon (Moyle et al. 2008).

Salmonids share requirements for cold, clean water, with sufficient quantity to provide winter passage and summer pools. They also need abundant invertebrate food supplies, appropriate spawning gravels, high-flow refugia, and functioning estuaries. Mature native riparian vegetation provides both shade to cool the water and food supply. (Prunuske Chatham, Inc. 2010)

Installation of the program's conservation practices will result in improvement of salmonid habitat through reduction of erosion and the amount of fine sediments entering into streams and creeks. Livestock access to watercourses will be limited, which will result in an improvement in water quality. Planting of riparian vegetation will provide shade and cooler water temperatures. Fish stream improvement will create needed pool and riffle stream characteristics and provide upstream connectivity to make more habitat available for spawning and rearing.

Coho Salmon

Coho are currently known to spawn in the program area but only within the Lagunitas Creek watershed. Each year approximately 500 adult male and female coho return to spawn, although, in poor years, as few as 100 fish have returned. In 2005, an especially good year, 496 coho redds and 1,830 live coho were recorded in the Lagunitas Creek watershed not including Olema Creek (MMWD 2008). The population represents approximately 10% of California's native coho population.

Coho move from the ocean into the Lagunitas Creek watershed from November to January. However, spawning was observed in mid-October in 2000. Once hatched, juveniles will seek protective cover near woody debris, large boulders, and root wads. They live in the protective cover for 14-16 months. After 16 months, juvenile smolts begin their downstream migration at night in the spring peaking in May. After reaching saltwater and undergoing physiological adaptations, they remain in the ocean for 16-18 months before returning to Lagunitas Creek.

Steelhead Trout

Steelhead trout have been reported in Walker and Stemple Creeks, but the historic population in Stemple Creek is believed to be extirpated. The Lagunitas Creek run is healthier than in most other central California streams. The Walker Creek run varies from year to year, but steelhead can be observed most years in the mainstem and lower portions of tributaries where barriers to passage do not exist.

Chinook Salmon
Chinook are occasionally sighted in the Lagunitas Creek watershed. Chinook generally spawn from October to mid-January. However, in 2004-2005, they shifted later with peak spawning co-occuring with the peak of coho spawning. The number of Chinook salmon spawning in the watershed has been increasing. There were 11 Chinook redds recorded in 2001, 27 in 2004, and 44 in 2005 (MMWD 2008).

California red-legged frog
The California red-legged frog (CRLF) is the largest native Californian frog, growing up to 5.25 inches long. CRLF tend to spend the entire year near or in water but have been known to move long distances at night during winter rainstorms. CRLF require a mixture of upland and aquatic breeding habitat. The upland areas must have habitat complexity such as downed woody vegetation, abundant leaf litter, or abandoned small mammal burrows to provide refuge from predators and allow frogs to stay moist. Breeding areas need slow water or backwaters and emergent vegetation. Waterways with overhanging shade are preferred.

CRLF breed in both ephemeral and permanent water. Breeding season ranges from late winter to early spring. From egg laying to metamorphosis may be 3.5 to 7.5 months. Although CRLF can breed in permanent water, nonnative bullfrogs, which require permanent water to complete their 2-year tadpole stage, often prey on CRLF; therefore, CRLF appear to breed more successfully in seasonal water.

CRLF previously ranged from Baja California to southern Mendocino County and into the Sierra foothills; however, they have been eliminated from over 70% of their former range (USFWS 2010). Although they are now very rare in the Sierra foothills and the Los Angeles area and no longer occur south of Los Angeles, they remain very abundant in west Marin, making the area critical for species preservation. About 64,000 acres of CRLF critical habitat are designated within the Marin Coastal Watersheds Program Area.

California freshwater shrimp
California freshwater shrimp (CFS) live in low-elevation, low-gradient perennial streams in Sonoma, Marin and Napa counties. Freshwater shrimp are detritus eaters. They live in areas away from the main stream current in pools of undercut banks where exposed root systems, such as willow and blackberry, and vegetation hanging into the water provide food and protection from high flows. Lighter roots catch detritus and provide a path the shrimp walk along as they feed. Debris jams also provide good summer habitat, but these are becoming less common.

Once common, CFS now occur in only a small number of streams. Populations have been confirmed in ±21 streams. Many of populations are very small. Other areas have been extensively searched. Robust populations occur in Lagunitas Creek in the project area and elsewhere in Sonoma County in the Salmon and Blucher Creek watersheds (Serpa 1996).

San Bruno elfin butterfly
The San Bruno elfin butterfly is a small, brown-toned butterfly that lives on rocky outcrops in coastal scrub or coastal woodlands and forests in San Mateo, Marin, and Contra Costa counties. The butterflies lay eggs in February and March on a specific broadleaf stonecrop *(Sedum spathulifolium*). The eggs hatch within a week, and larvae grow feeding upon the host plant all during the spring. While larvae are growing, they are

tended by ants that eat honeydew produced by the caterpillars and protect them from predators. In June, they form pupae in the leaf litter near the host plant and are dormant until early spring when they emerge as adults to begin the process again. (Essig Museum of Entomology 2010; USFWS 2010)

San Bruno elfin butterflies are dependent on the presence of their host plant, broadleaf stonecrop, and on healthy ant populations. There are 6 known populations remaining, two of which occur in the program area. They are vulnerable to development, changes in vegetation, and use of pesticides and herbicides (Xerces Society 2010).

Myrtle's silverspot
The Myrtle's silverspot butterfly is a two-inch, brown-toned butterfly with distinctive black and silver spots on its upper wing surface. They live in coastal dune or prairie habitat. Females lay eggs at the end of summer in dry debris of *Viola adunca*, the larval food plant for the species. The larvae crawl away from the plant and enter dormancy until spring, when they find a *Viola* to live on and eat for 7-10 weeks until ready to pupate. Like the San Bruno elfin butterfly, larvae are protected by ants. Adults emerge after two weeks. The adult flight season is generally June to early September.

Critical habitat elements for the species are the presence of ants, *Viola adunca*, and nectar sources for adult, including western pennyroyal, gumweed, seaside daisy, and yellow sand verbena (USFWS 2009; Xerces Society 2010). The historic range of the species reached from Año Nuevo to the Russian River. Only 4 populations remain, 3 of which are in the program area.

Northern spotted owl
The Northern spotted owl is a medium-sized raptor that lives in older forested habitats or redwood or mosaic forests that contain the structural characteristics required for nesting, roosting, and foraging (i.e., a multi-layered, multi-species canopy with moderate to high canopy closure and high incidence of trees with large cavities and other types of deformities; large snags (standing dead trees); an abundance of large, dead wood on the ground; and open space within and below the upper canopy for spotted owls to fly (USFWS 2010)). Spotted owls are long-lived and produce few, intensively raised offspring. Spotted owl pairs don't nest every year and aren't always successful when they do. Spotted owls are territorial; however, home ranges of adjacent pairs can overlap. Spotted owls are mostly nocturnal, but they may forage opportunistically during the day.

Northern spotted owls occur from southwestern British Columbia south to Marin County. They are primarily impacted by loss of habitat. They are typically sensitive to activities anywhere close to their nest sites and are highly disturbed by nighttime lighting.

Potential Impacts on Special-status Species and Program Impact Avoidance Measures

Although the program will have long-term benefits for special-status and common species, implementation of program practices may generate short-term impacts. Individuals may alter their behavior to avoid a project area, need to be relocated out of the project area, or even be killed during construction or herbicide application. Any of these consequences to a listed species would constitute take under the state and federal Endangered Species Acts. When deemed necessary by the regulators, an Incidental Take Statement will be obtained to cover specific project activities that may result in take

of a protected species. All conditions contained in such a permit are deemed part of the mitigation measures herein and will be included in the contracts between the RCD, NRCS, and/or PRNS and the cooperator.

Marin RCD, NRCS, and/or PRNS projects that do not qualify for the permit coordination program (either because they use practices other than the 17 listed practices or cannot meet the size limits or permit conditions) will use the traditional permit mechanism wherein the cooperator is responsible for obtaining permits for the proposed work. For projects that are conducted as part of the program, the following measures will be employed to avoid impacts on specific species.

Specific Actions to Avoid or Minimize Impacts on Salmonids
As part of Marin Coastal Watersheds Permit Coordination Program, the following mitigation measures will be followed to ensure protection of salmonids:

- Prior to each construction season, Marin RCD, NRCS, and/or PRNS will submit proposed annual projects with details on construction techniques, stream conditions at time of work, and proximity and connectivity to known habitat for regulatory approval, including consultation with CDFG and/or NOAA Fisheries staff.

- Marin RCD, NRCS, and/or PRNS will meet with NOAA Fisheries, CDFG, and other regulators in the spring of each year to review the individual projects. The purpose of this meeting is to determine if take is likely to occur. Regulators may provide additional conditions on the projects where take may occur. Such conditions will be included in a memo from the RCD, NRCS, and/or PRNS to the agencies, to be confirmed in writing within 60 days. Marin RCD, NRCS, and/or PRNS will include those conditions as part of the project plan and contracts with the cooperator.

- If unforeseen circumstances arise in project implementation that may lead to adverse effects to steelhead, coho salmon, Chinook salmon, or their habitat, operations will cease immediately and CDFG and NOAA Fisheries will be contacted.

- In specific cases where it is deemed necessary to work in a flowing stream or creek, the work area will be isolated, and all flowing water temporarily diverted around the work site to maintain downstream flows during construction. When construction is completed, the flow diversion structure will be removed in a manner that will allow flow to resume with the least disturbance to the substrate. Fish will not be trapped or isolated by the diversion structure.

- A qualified biologist will prepare a project-specific species protections and dewatering plan. The qualified biologist will be present on site during dewatering and removal or decommissioning of the temporary diversion and as needed to protect sensitive aquatic resources during project construction. Marin RCD, NRCS, and/or PRNS, in consultation with the NOAA Fisheries and/or CDFG, will determine the expertise needed by the monitor.

Specific actions to avoid or minimize impacts on the California freshwater shrimp
Marin RCD, NRCS, and/or PRNS staff or their designees will conduct reconnaissance-level surveys to determine if suitable habitat for CFS occurs in the project area. The following avoidance measures will be employed:

- No activities will be conducted in channels with flowing or standing water within potential CFS habitat.
- Project activities will avoid removal of or damage to overhanging vegetation along stream channels.
- Overhanging banks within potential shrimp habitat will remain undisturbed.
- Project activities requiring heavy equipment will occur only between June 15 and October 15 and will not occur during rainfall.
- No rock structures will be constructed in channel bottoms that may interfere with shrimp migration between in-channel pools; this includes riprap for bank stabilization.
- Animal trails and walkways will not be constructed in CFS habitat.

Specific actions to avoid or minimize impacts on the California red-legged frog
Marin RCD or NRCS staff will conduct reconnaissance-level surveys to determine if suitable habitat for CRLF occurs within the program area.

- If the project site occurs in potential red-legged frog habitat, a qualified biologist approved by the USFWS will conduct a pre-construction survey no more than 48 hours before the start of construction activities. The biologist will look for species, evaluate the likelihood of usage, and determine if additional biological monitoring is needed during construction to ensure that individuals present will be removed or avoided.
- If CRLF are observed during pre-construction inspections, USFWS will be contacted before work activities begin for technical assistance, determination if additional protection measures are needed, and assistance in selecting locations for suitable release sites up- or downstream of the project site.
- Projects within potential CRLF habitat will be designed to minimize disturbance to vegetation near or in permanent and seasonal pools of streams, marshes, ponds, or shorelines with extensive emergent or weedy vegetation.
- All construction within stream channels will take place during daylight hours.
- If suitable habitat is present, project activities will begin after July 1 to avoid impacts on breeding CRLF adults or egg masses.
- If monitoring during construction is needed, a USFWS-approved biologist will have the authority to halt work activities that may adversely affect CRLF until they can be moved out of the project area.
- Translocation of CRLF will be performed only by individuals approved in advance by USFWS.

Specific actions to avoid impacts on Northern spotted owl
Marin RCD, NRCS, and/or PRNS staff or their designees will conduct reconnaissance-level surveys to determine if suitable habitat for Northern spotted owl (NSO) habitat occurs within 0.25 mile of the proposed work area. The indicators of potential NSO habitat are:

- Any coniferous forest stand with trees greater than 11" diameter at breast height AND total canopy closure greater than 40%,

or

- One or more large, residual, old growth trees.

If habitat is known to occur and the absence of NSO cannot be verified, Marin RCD or NRCS will assume the species is present. Under these circumstances, Marin RCD or NRCS will either 1) perform work after July 31 or 2) implement sound reduction measures to ensure that activities do not significantly raise noise above ambient levels. These measures can include, but are not limited to, laying a bed of sand before unloading gravel or rock from a truck and/or disabling "back-up beepers" on equipment.

Actions to avoid impacts on listed butterflies

Marin RCD, NRCS, and/or PRNS staff or their designees will conduct reconnaissance-level surveys to determine whether suitable habitat for larval host or nectar plants are present within the work area. If suitable habitat exists or if a host plant is found, project work will be carried out with minimum soil compaction. Wherever possible, work will be performed with hand tools. Host plants of the listed butterflies, broadleaf stonecrop and *Viola adunca* will be protected under the same protocols as listed plants; see below. Other protective measures include:

- If host and nectar plants are present, a qualified biologist will perform surveys according to USFWS protocols to determine presence or absence of the butterflies.
- If Myrtle's silverspot butterfly or San Bruno elfin butterfly are observed during pre-construction surveys, USFWS will be contacted before work activities begin for technical assistance and determination if additional protection measures are needed.
- If unforeseen circumstances arise in project implementation that may lead to adverse effects to Myrtle's silverspot butterflies or their habitat, operations will cease immediately and USFWS and CDFG will be contacted.
- If monitoring during construction is deemed necessary, a USFWS-approved biologist will have the authority to halt work activities that may adversely affect listed butterflies.
- If presence of the Myrtle's silverspot or San Bruno elfin butterfly is confirmed, alterations to existing habitat conditions will be evaluated by a qualified ecologist to determine the effect of such changes on the butterfly population prior to construction (i.e., hydrologic changes to the soil, alteration of grazing regimes, and revegetation).
- No pesticides or herbicides will be used at the project site.

Actions to avoid impacts on listed plant species

Marin RCD, NRCS, and/or PRNS staff or their designees will conduct reconnaissance-level surveys to determine if suitable habitat for listed plant species is present within the work area. If suitable habitat exists or if a listed species is found, a qualified botanist will identify and evaluate the characteristic habitats. Protective measures include:

- If the project area supports listed plant species, the plants will not be disturbed.

- When listed plant species are found in a project area, a buffer zone of 20 feet will be established around the plants to avoid impacts.
- No fertilizers will be used in the 20-foot buffer zone to hasten or improve the growth of plantings associated with the project.

Measures to avoid or minimize impacts to other protected species during implementation of conservation practices
As part of Marin Coastal Watersheds Permit Coordination Program, the following avoidance and mitigation measures will be followed to ensure protection of other protected species:

- Marin RCD will submit to USFWS prior to each construction season a summary of proposed projects with details on construction techniques, stream conditions at time of work, and proximity and connectivity to known habitat.
- USFWS may provide additional conditions on the projects where take may occur. Such conditions will be included in a memo from the Marin RCD, NRCS, and/or PRNS to the agencies, to be confirmed in writing within 60 days. Marin RCD, NRCS, and/or PRNS will include those conditions as part of the project plan and in the individual contracts with the cooperator.
- If unforeseen circumstances arise in project implementation that may lead to adverse effects to the named species or their habitat, operations will cease immediately and USFWS will be contacted.

b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community: **less-than-significant impact.**

Restoration of riparian habitats is central to the purpose of the program. Practices that enhance riparian habitat and vegetation include critical area planting, pipeline installation, fish stream improvement, streambank protection, and stream channel stabilization. These conservation and restoration practices will improve both the quantity and quality of riparian habitat by stabilizing eroding soils, preventing cattle from grazing in riparian areas, and managing sources of erosion that can occur in riparian areas.

The conservation practices are designed to avoid and/or minimize disturbance to riparian areas. Specific avoidance measures include:

- Except with approval from CDFG staff, there will be no cutting or removal of native trees 4” or greater diameter at breast height (dbh), except willows, for which there will not be cutting or removal of trees 6” or greater dbh.
- For any permitted removal of any native tree, the root structure of the tree will be left intact unless authorized by CDFG staff.
- No more than 0.10 acres of native riparian shrubs or woody perennials will be removed from a stream area. Where the area contains a mix of native and invasive species, up to 0.25 acres may be removed from a streambank or stream channel. If the area is exclusively nonnative plants, up to 5 acres of riparian vegetation may be removed. Any area cleared of vegetation must be revegetated with native plant species.

- Non-invasive, non-persistent grass species (i.e., barley grass) may be used in conjunction with native species to provide fast establishing, temporary cover for erosion control.
- Any streambank area left barren of vegetation as a result of the implementation or maintenance of the practices will be restored to a natural state by seeding, replanting, or other agreed upon means with native trees, shrubs, and/or grasses prior to October 15 of the project year. Work beyond the time frame may be authorized following consultation with and approval of the local CDFG biologist, provided it could be completed prior to first flows. Barren areas will typically be planted with a combination of willow stakes, native shrubs and trees, and/or native erosion control grass mixes.

Other sensitive communities occurring in the program area include:

- Coastal Brackish Marsh
- Coastal Terrace Prairie
- Coastal and Valley Freshwater Marsh
- Northern Coastal Salt Marsh
- Northern Maritime Chaparral
- Northern Vernal Pool
- Serpentine Bunchgrass

Work in coastal brackish marsh, northern coastal salt marsh, northern vernal pool, and serpentine bunchgrass is excluded from the program. Impacts on freshwater marsh are addressed in c) below. Where work will occur in coastal terrace prairie or northern maritime chaparral, the following measures will be implemented to avoid any long-term impacts:

- Prior to project design, the site will be surveyed by a qualified botanist to establish the presence of any special-status plants. If such plants are found, the project will be designed to avoid them.
- No herbicides will be used in coastal terrace prairie or northern maritime chaparral.
- Areas disturbed by construction will be replanted with local cultivars of native species.

c) Have a substantial adverse effect on wetlands: **less-than-significant impact.**

One of the long-term beneficial effects of the program is improvement of wetlands in the watersheds. Work under the PCP will be authorized under the federal Clean Water Act by the U.S. Army Corps of Engineers through Nationwide Permit (NWP) NWP 13 (Bank Stabilization), NWP 27 (Aquatic Habitat Restoration, Establishment, and Enhancement Activities), and/or NWP 33 (Temporary Construction, Access and Dewatering). The applicable terms of those permits are contained in Appendix 3.

The conservation practices can be used to restore natural wetland functions, to stabilize erodible soils to prevent soil accumulation in wetlands, to collect sediments before they enter waterways and wetlands, and to provide watering areas for livestock away from sensitive habitats. Only projects that result in a net environmental benefit are included in this program. Short-term impacts on wetlands, such as soil excavation or grading, preparation of the ground for seeding and mulching, grade and stream stabilization, channel excavation, construction of earthen embankments, placement of fill, vegetation removal, and burial, trampling, or crushing of vegetation from equipment and foot traffic, will be mitigated by improved water quality and wetland habitat values as a result of project installation. Projects in tidally influenced wetlands and waters or in vernal pools are not included in the permit coordination program.

d) Interfere with movement of native or migratory fish or wildlife: **less-than-significant impact.**

This program is designed to improve habitat for migrating fish, specifically coho salmon, Chinook salmon, and steelhead trout. By reducing the contribution of sediment to the waterways, improving aquatic and riparian habitat, and removing fish passage barriers, the program will have an overall net benefit to movement of native and migratory fish. To avoid temporary impacts to salmonid migration, construction that requires dewatering or temporarily reduces up and downstream connectivity will not occur during important movement windows.

In specific cases where it is deemed necessary to work in a flowing stream or creek, the work area will be isolated, and all flowing water temporarily diverted around the work site to maintain downstream flows during construction. When construction is completed, the flow diversion structure will be removed in a manner that will allow flow to resume with the least disturbance to the substrate. Fish will not be trapped or isolated by the diversion structure. A qualified biologist will be present on site during dewatering and removal or decommissioning of the temporary diversion and as needed to protect sensitive aquatic resources during project construction. The Marin RCD, NRCS, and/or PRNS, in consultation with USFWS, NOAA Fisheries, and/or CDFG, will determine the expertise needed by the monitor.

e) Conflict with Local Policies or Ordinances: **no impact.**

The program has been reviewed for consistency with the following local ordinances:

- Marin County Local Coastal Plan – The Local Coastal Plan (LCP) currently under development calls for protection of environmentally sensitive habitat (ESHA), removal of nonnative invasive species, planting of native species, wetland protection, and a strong monitoring program. The Marin Coastal Watershed Permit Coordination Plan will do all these things. Appropriate, scientifically based setbacks are still being developed for the LCP and will be used once adopted.

- Marin County Zoning Ordinance – The program will not change any zoning.

- Marin Countywide Plan – One of the 12 organizing goals of the Countywide Plan is to protect agricultural assets. The PCP fosters that goal by promoting agricultural sustainability. Goal AG-1 calls for sustaining agriculture by protecting large parcels and important soil, water and forage. The program not only

addresses the general spirit of this goal but also addresses specifics such as the call for stewardship plans by helping landowners create ranch plans. The program does not conflict with any goals or policies of the Marin Countywide Plan.

- National Park Service General Plan – Program projects run within the PRNS will either be on leased land and consistent with the terms of those leases or on NPS operated property and planned in cooperation with PRNS staff to be compatible with the NPS General Plan.

f) Conflict with Provisions of an Adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other Approved Local, Regional, or State Habitat Conservation Plan: **no impact.**

No habitat conservation plans or natural community conservation plans are in place in the program area. In spring 2010, the Marin County Board of Supervisors accepted the *San Geronimo Valley Salmonid Enhancement Plan* (PCI 2010). While no specific provisions of this plan have been adopted, a specific set of actions and planning limits is described that would protect and enhance salmonid habitat in San Geronimo Creek, tributary to Lagunitas Creek. The Marin Coastal Watersheds Permit Coordination Program is fully compatible with the *San Geronimo Valley Salmonid Enhancement Plan* and shares many of the same goals.

Cultural Resources

	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
V. Cultural Resources: Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	☐	☐	☐	☒
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	☐	☐	☒
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☐	☒
d) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	☒	☐

Discussion:

a), b), & c) Cause a substantial adverse change historical, archaeological, or paleontological resources: **no impact.**

RCD, NRCS, and/or PRNS policies ensure that the effects of conservation activities on historic properties are considered in the earliest planning stages and that cultural resource protection is accomplished as efficiently as possible. As with all RCD, NRCS, and/or PRNS conservation projects, including those covered by the permit coordination program, the Marin RCD, NRCS, and/or PRNS identify, examine, consider, and avoid potential impacts on cultural resources. Any conservation or restoration activities that would cause an adverse impact on cultural resources does not qualify for the Marin Coastal Watersheds Permit Coordination Program. All projects implemented under this program operate under 36 CFR 800.

Once a project has been selected, a preliminary design is developed that includes project boundaries, access, and equipment required for implementation. Potential impacts on cultural resources will be evaluated in cooperation with the Federated Indians of Graton Rancheria (FIGR). Site visits will occur, as requested by FIGR, to identify potential impacts and avoidance and mitigation measures that will become part of the project description and permit requirements.

d) Disturb any human remains: **less-than-significant impact.**

No work will occur in areas of known human remains. In the event of inadvertent discovery, all work will stop in the immediate vicinity of the discovered remains. The County Coroner and a qualified archaeologist will be notified immediately so that an evaluation can be performed. If the remains are deemed to be Native American and prehistoric, the Native American Heritage Commission will be contacted by the Coroner so that a “Most Likely Descendant” can be designated. Work will cease until the “Most Likely Descendant” has time to propose a mutually acceptable disposition for the remains to the landowner.

Geology and Soils

	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
VI. Geology and Soils: Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:	☐	☐	☐	☒
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known	☐	☐	☐	☒

	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
VI. Geology and Soils: Would the project:				
fault? Refer to Division of Mines and Geology Special Publication 42?				
ii) Strong seismic ground shaking?	☐	☐	☐	☒
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☐	☒
iv) Landslides?	☐	☐	☒	☐
b) Result in substantial soil erosion or the loss of topsoil?	☐	☒	☐	☐
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☐	☒
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☐	☐	☒
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☒

Discussion:

a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

i. Rupture of a known earthquake fault: **no impact.**

The main line of the San Andreas fault runs through the program area; however, the program will not create structures that add to the hazards of a rupture along the fault line.

ii. Strong seismic ground shaking: **no impact**

In the event of a serious rupture on the San Andreas fault, the program area is expected to undergo strong to very violent shaking intensity (ABAG 2010). Installation of small-

scale erosion control and water management structures, plantings, and minor grading will not change the local impacts of the shaking.

iii. Seismic-related ground failure, including liquefaction: **no impact.**

Although most of the program area has very low liquefaction potential, there are limited areas with moderate potential. The risk of slope failure, liquefaction, or structural failure is addressed during the planning process. NRCS produces the Soil Survey of Marin County and specializes in soil science interpretations. NRCS engineers consider soil physical factors when selecting and designing conservation measures. The planning process and policies of the Marin RCD, NRCS, and/or PRNS require all projects to be evaluated for soil hazards and mitigated if appropriate. The Marin RCD, NRCS, and/or PRNS do not work in areas of known geologic instability without approval of a certified engineer. Therefore, there is no potential for a negative impact on ground failure.

iv. Landslides: **less-than-significant impact**

The program area has significant portions categorized as "many landslides" (ABAG 2010). As described in iii) above, the project selection and planning process takes soil hazard conditions into consideration. In no case will project activities exacerbate these situations, and in some cases the area may be more stable versus slides than before the project. The critical planting area and streambank protection practices will tend to stabilize the earth against minor movement by increasing the depth and density of major root systems but will likely have no effect on major slides or slides in motion because of a strong earthquake.

Best management practices will be utilized during construction to prevent soil loss and polluted runoff (see discussion in the Environmental Protection and Mitigation Measures section above). For example, when implementing or maintaining a critical area planting above the high water line, a filter fabric fence, fiber rolls and/or hay bales will be utilized, if needed, to keep sediment from flowing into the adjacent waterbody. Annual review by Marin RCD, NRCS, and/or PRNS will occur until the critical area planting is established to control erosion.

b) Result in substantial soil erosion or loss of topsoil: **less than significant with mitigation**.

Projects to be implemented under the permit coordination program have the stated purpose of reducing or eliminating soil erosion. Soil conservation practices covered by this program have been determined by the RCD, NRCS, and/or PRNS to have a net environmental benefit observable in the first year after construction. Thus, any contributions of sediments from construction are offset within the first year by the functioning of the conservation practice.

The conservation projects are designed to minimize impacts during construction. Best management practices will be utilized during construction to prevent soil loss and polluted runoff. For example, when implementing or maintaining a critical area planting above the high water line, a filter fabric fence, fiber rolls and/or hay bales shall be utilized, if needed, to keep sediment from flowing into the adjacent waterbody.

c) & d) Be located on a geologic unit or soil that is unstable, or that would become unstable . . .: **no impact**.

Soil stability is addressed as described in a) iii) and iv) above to ensure that practices will be stable where implemented. None of the practices in the program includes elements that would destabilize landslides or cause other soil hazards.

e) Have soils incapable of adequately supporting the use of septic tanks … where sewers are not available for the disposal of waste water? **no impact**.

The question is not applicable as no sewers or septic systems are involved in the program.

Greenhouse Gas Emissions

	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
VII. Greenhouse Gas Emissions: Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☐	☒

Discussion:

a) Generate greenhouse gas emissions that may have a significant impact on the environment: **less-than-significant impact.**

The program will generate small levels of greenhouse gas emissions from construction equipment. It is anticipated that the PCP will include an average of 6 projects per year. Implementation of each project may take 1 to 6 weeks, depending on the practices to be installed. The program may generate 58 Tonnes CO_2E per year.[2] This is equivalent to adding about 10 passenger vehicles to the road (EPA 2010a) during the time of construction.

[2] The estimate was produced using EPA emission factors. Each gallon of diesel produces 22.2 pounds of CO2. Heavy equipment such as backhoes and tractors can use up to 2 gallons diesel/ hour. This estimate presumes 6 projects of 6 weeks duration using 2 pieces of heavy equipment. By using maximum possible values for each parameter, this calculation overestimates the actual greenhouse gas emissions. The emissions were calculated as ((1 Tonnes CO_2 E/2200 pounds CO_2 E)(22.2 pounds CO_2 E/gallon)(2 gallons/equipment hourhour)(16 equipment hours/day)(5 days/week)(6weeks/project)(6 projects/year)=58 Tonnes CO_2 E/ year). Most projects will be substantially less than this, so the estimate of emissions is higher than actually anticipated from program implementation.

Many of the projects will include planting riparian vegetation. Carbon sequestered yearly by new tree canopy and willow plantings will likely be about 0.9 Tonnes CO_2E per year.[3] As emissions for each year's projects will last only a single year, but sequestration will continue for more than 100 years, this is approximately 90 Tonnes CO_2E sequestered for 60 Tonnes CO_2E produced. These estimates are very approximate and do not take into account the particular kinds of trees that will be planted or the exact specifications or numbers of future projects. However, the estimate has been made very conservatively – overestimating the amount of greenhouse gases produced and underestimating the amount sequestered. Further, more of the program projects involve planting without grading than grading without planting. Therefore, it is reasonable to conclude that the overall amount of greenhouse gases sequestered by the program will be larger than the amount produced.

b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing greenhouse gas emissions: **no impact.**

Greenhouse gas plans and policies in effect in the program area are generated by County of Marin and the State of California. The County of Marin General Plan Natural Systems and Agriculture Element Goal Air-4 addresses mitigation of greenhouse gas emissions. Implementation program Air-4.d calls for establishing a program to reduce emissions from agricultural operations. The Marin Coastal Watersheds Permit Coordination Program will not interfere with the ability of ranchers and farmers to comply with this County implementation measure. The program will actively promote compliance with Measures Air-4.j, Acquire and Restore Natural Resource Systems, Air-4.k, Encourage Planting of Trees, and Air-4.l, Preserve Agricultural Lands. California has enacted three significant pieces of climate change legislation:

- AB 32 – The Global Warming Solutions Act – addresses total greenhouse gas emissions across the state and throughout the different sectors of California's economy.
- SB 375 requires emissions reductions from automobiles and light trucks.
- SB 97 requires consideration of climate change in all environmental assessments under CEQA, regardless of the specific source of greenhouse gases or other climate change effects.

Of these, only AB 32 directly applies to agricultural practices. The California Air Resources Board (CARB) has been tasked with developing a plan for implementation of AB 32. The initial 5-year scoping plan is now in effect. The plan includes methane capture at large dairies and encourages voluntary reductions in other sources and agricultural operations to sell carbon credits from voluntary reductions and carbon sequestration efforts. No part of the program will conflict with these measures.

[3] This estimate is produced from assuming a mixture of container trees and willow brush mats. Trees will likely sequester about 2 Tonnes CO2 E/hectare/year (Kadyszewski 2004; Mander et al. 2008), and willows will likely sequester about 1 Tonnes CO2 E/hectare/year (Stadnyk 2010). The estimate presumes approximately equal areas of riparian canopy trees and willow plantings for 6 projects per year with a planted area of about 0.1 hectare. The sequestration was calculated as (6 projects)(0.1 hectare/project)(1.5 Tonnes CO2 E/hectare/year)=0.9 Tonnes CO2 E/ year).

Hazards and Hazardous Materials

	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
VIII. Hazards and Hazardous Materials: Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☒	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒

	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
VIII. Hazards and Hazardous Materials: Would the project:				
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☐	☒

Discussion:

a) & b) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials or through reasonably foreseeable upset and accident conditions: **less-than-significant impact.**

None of the sites involves use of hazardous materials except the common ones used in all vehicle operation and limited use of herbicides to control invasive plants. Use and storage of construction equipment at the site will occur during implementation of the practices. The RCD, NRCS, and/or PRNS will ensure that adverse impacts do not occur during routine operations by implementing the following limitations on construction equipment:

- The amount of time heavy equipment is stationed, working, or traveling within the creek bed will be minimized.
- Heavy equipment will not be used in a flowing stream, creek, or ponded area, except to cross a stream or pond to access the work site.

The RCD, NRCS, and/or PRNS will ensure that adverse impacts do not occur from use of potentially hazardous materials by implementation of the following limitations:

- The use or storage of petroleum-powered equipment will be accomplished in a manner to prevent the potential release of petroleum materials into waters of the state (Fish and Game Code §5650). The following precautionary measures will be followed:
  - Major vehicle maintenance and washing will be done off site.
  - If needed, a contained area located at least 100 feet from a watercourse will be designated for equipment storage, minor maintenance, and refueling. If possible, these activities will not take place on the project site.

- Areas where fuel or hazardous materials are stored at the project site will be provided with secondary containment in the form of an earthen berm or other engineered revetment. The area contained by the berm will be sufficient to contain all fluids stored within the berm.

- Vehicles will be inspected for leaks and repaired immediately.

- All construction debris and sediments will be taken to appropriate landfills or in the case of sediments, disposed of away in upland areas or off-site.

- Leaks, drips and other spills are cleaned up immediately to avoid soil or groundwater contamination.

- Clean up of leaks or spills will be performed to the satisfaction of the Regional Board in a time frame satisfactory to the Regional Board.

- All spent fluids including motor oil, radiator coolant, or other fluids and used vehicle batteries will be collected, stored, and recycled as hazardous waste off site.

- Dry cleanup methods (i.e. absorbent materials, cat litter, and/or rags) will be used whenever possible. If water is used, the minimal amount required to keep dust levels down will be used.

- Spilled dry materials will be swept up immediately.

The RCD, NRCS, and/or PRNS will ensure that adverse impacts do not occur from use of pesticides, herbicides, and chemical fertilizers by implementation of the following limitations:

- No chemically treated timbers will be used for grade or channel stabilization structures, bulkheads, or other in-stream structures.

- No pesticides, with the exception of or herbicides application as described below to control established stands of exotics or to control the invasion of exotics into restoration plantings, will be used as part of the permit coordination program.

- No herbicides will be used where threatened or endangered species occur.

- Organic amendments will be used to ensure successful establishment of restoration vegetation associated with the practices. Organic fertilizers may be used above the normal high water mark the year of planting, if necessary. No chemical fertilizers will be used. [DFG C2]

- In general, hand labor will be used to control exotic vegetation at the site. Under extreme circumstances and with regulatory approval, herbicides may be applied to control established stands of nonnative species. Application will be compliant with the California Department of Pesticide Use regulations in accordance with Material Safety Data Sheets, Marin County Agriculture Commission's Weed Management Plan, manufacturer's instructions, and/or under the guidance of a registered pesticide advisor.

- Where it is necessary to use herbicides to control established stands of exotics or to control the invasion of exotics into restoration plantings, the herbicides must be applied by hand by a licensed applicator in accordance with manufacturer's recommendations and registered label conditions. Herbicides must be applied directly to plants and may not be spread upon any water or where they can leach into waterways in subsequent rains. [DFG C2] Application will occur in a manner that minimizes drip and drift into the water and only on calm days (wind less than 5 miles per hour) to prevent airborne transfer of herbicide.

- In riparian environments, an herbicide (without a surfactant) that has been registered for use in an aquatic environment (i.e., Rodeo™) and on target vegetation will be utilized. No broadcast spraying will occur. Great care will be taken to avoid contact with native species.

On National Park Service lands, herbicides will be applied using backpack sprayers in accordance with National Park Service Integrated Pest Management regulations and California Department of Pesticide Use regulations in accordance with Material Safety Data Sheets. No foliar spraying is allowed in riparian habitats. Any proposed herbicide ground spraying within 100 feet of a creek are not included in the permit coordination program. During the dry season (July 1 to November 15), select stumps of nonnative trees and shrubs within riparian zones may be treated by painting herbicides. [NPS]

c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste: **no impact.**

The program does not include the use of any acutely hazardous materials.

d) Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5: **no impact.**

Two sites occur in the program area that are on the California Department of Toxic Substances Control (DTSC) Section 65962.5 list. Both are former military facilities. One is an old army site located approximately 2 miles west of Bolinas and the other near Drakes Bay. The site near Bolinas is now in private residential use. It has been investigated and determined that no further action is required. The site at Drake's Bay was partially located in the bay itself on Chimney Rock and in the Pacific Ocean. The land portion of the facility is now part of PRNS. The land has public trails that are currently and safely in use. There are two potential sites with undetonated explosives, one within historic gun turrets and one within Drake's Bay. These potential explosives are still under investigation by DTSC. Neither will be within the project area of any program activities.

In addition to the above sites, the California Environmental Protection Agency (CalEPA) identifies the Gambonini mercury mine as a Section 65962.5 site. This site has experienced substantial erosion that is carrying mercury contamination downstream into Tomales Bay and is a substantial environmental hazard. CalEPA is working with the landowners to remediate the site. The Marin RCD may choose to be involved in this clean up, but it will occur as an individual action outside the permit coordination program.

e) & f) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, or a private airstrip: **no impact.**

There are no public airports or public use airports or private airstrips within two miles of the program area.

g) & h) Impair implementation of or physically interfere with an adopted emergency or expose people or structures to a significant risk from fires: **no impact.**

The program does not include actions that could limit emergency response or alter fire hazards.

Hydrology and Water Quality

	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
IX. Hydrology and Water Quality: Would the project:				
a) Violate any water quality standards or waste discharge requirements?	☐	☐	☐	☒
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☐	☒
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on- or off-site?	☐	☐	☒	☐

	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
IX. Hydrology and Water Quality: Would the project:				
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site?	☐	☐	☒	☐
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☒	☐
f) Otherwise substantially degrade water quality?	☐	☐	☒	☐
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	☒
h) Place within a 100-year flood hazard area structures that would impede or redirect flood flows?	☐	☐	☒	☐
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☐	☐	☒
j) Inundation by seiche, tsunami, or mudflow	☐	☐	☐	☒

Discussion:

Design criteria, implementation, and maintenance of the RCD, NRCS, and/or PRNS conservation practices are specific to the hydrologic conditions of the Marin coastal watersheds. The conservation practices selected for coverage by this permit coordination program are specifically designed to stem and resolve erosion and sediment problems, to minimize polluted runoff from agriculture, including nutrients, fertilizers, and pesticides/herbicides, and to be installed in such a manner that there is low to no risk of causing environmental impacts. Best management practices and erosion control measures are utilized both during construction and in the permanent

erosion control measures to avoid adverse impacts on adjacent watercourses, hydrology, and water quality.

a) Violate any water quality standards or waste discharge requirements: **no impact**.

The conservation practices included in the program will adhere to water quality standards and the programmatic federal Clean Water Act §401 Conditions or Waste Discharge Requirements. Typical examples of waste discharge prohibitions from the San Francisco Bay RWQCB that will apply to installation of the conservation practices include, but are not limited to, the following:

- Discharge of storm water from a facility or activity that causes or contributes to the violation of water quality standards or water quality objectives (collectively Water Quality Standards) is prohibited.
- Creation of a condition of pollution, contamination, or nuisance, as these terms are defined in California Water Code Section 13050(d), is prohibited.
- Discharge of soil, bark, slash, sawdust, or other organic and earthen material from any construction or associated activity of whatever nature into any stream or watercourse in quantities deleterious to fish, wildlife, or other beneficial use is prohibited.
- Placing or disposal of soil, silt, bark, slash, sawdust, or other organic material from any construction or associated activity of whatever nature at locations where such material could pass into any stream or watercourse in the basin in quantities that could be deleterious to fish, wildlife, or other beneficial uses is prohibited.
- Discharge of decant water from any on-site temporary sediment stockpile or storage areas or any other discharge of construction dewatering flows to surface waters, except as described in Limitations for Work in Wetted Areas above, outside of the active dredging site is prohibited.
- Maintenance activities that result in the direct or indirect discharge of waste, other than that authorized by this Order, as described in Section 13050(d) of the California Water Code, to surface waters or surface water drainage courses are prohibited unless authorized by separate permit action.
- Sediment removal may not occur in a flowing stream or standing water.

b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge: **less-than-significant impact.**

The Marin Coastal Watersheds Permit Coordination Program will not result in depletion of groundwater. Some conservation and restoration activities (such as installation of grade stabilization structures, in-stream and channel restoration work, stream channel stabilization work, restoration work relating to road stream crossings, and water control structures) may result in minor, short-term changes in the course and direction of surface water movement during construction. However, these changes would last only the length of a temporary dewatering structure and should have no adverse affect on

groundwater recharge. Since no impervious surfaces will be created through the 17 approved practices, and practices such as critical area planting and sediment detention basins will slow stormwater run-off thus enhancing groundwater recharge, any long-term effects on groundwater level should be beneficial.

c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on- or off-site: **less-than-significant impact.**

Ten of the 17 practices in the program (access road, animal trail and walkway, critical planting area, filter strip, grade stabilization structure, grassed waterway, lined waterway, sediment basin, underground outlet, water and sediment control basin) are designed to alter stormwater in ways that reduce erosion and silt-laden runoff. The grade stabilization structure practice involves reduction of stream velocity above and below the structure on a temporary basis to control grade. Improvements to existing farm and ranch roads through the access roads practice will redirect runoff from roads into safer outlets using waterbars and/or outsloping. Similarly, animal trails and walkways will reduce the erosion caused by trails that are inappropriately placed or insufficiently stable. Grassed waterways, lined waterways, and water and sediment control basins slow and redirect stormwater to reduce erosion and increase upland deposition of silt. Sediment basins directly catch silt before it can enter waterways. Underground outlets are used to direct concentrated runoff away from vulnerable areas and manage it to reduce erosion potential.

Although the remaining practices are not specifically designed to manage stormwater, they also help to control erosion. Two of the practices do not change the course of stormwater but directly reduce erosion by stabilizing eroding areas (streambank protection and stream channel stabilization). Two other practices reduce erosion by redirecting animal use away from riparian areas (pipeline, spring development). The remaining practices (fish passage, fish stream improvement, structure for water control) are largely concerned with in-stream habitat; however, their installation generally is designed in such a way as to avoid or minimize existing in-stream erosion issues.

Any potential short-term impacts resulting from construction disturbance will be avoided by use of construction best management practices and temporal limits on construction.

d) Alter drainage patterns in a way that could increase flooding: **less-than-significant impact.**

Rainfall and irrigation runoff and downstream flooding will be reduced as a result of implementation and maintenance of the conservation practices, which are designed to reduce runoff to the natural background level that would have occurred on the property prior to development of agricultural operations or impervious surfaces. These design objectives are achieved either through improved infiltration or through detention of peak flows. Infiltration is improved through the use of increased vegetative cover of bare soils (critical area planting, filter strips, grassed waterways) and improved agricultural soil and crop management.

Work along watercourses covered by this program will promote the use of biotechnical streambank protection. These practices increase the roughness of streambanks, thereby slowing the rate of discharge into downstream watercourses. Localized flooding

associated with slower discharge would be avoided by increasing the cross-sectional area of the channel or providing for a flood flow terrace as part of the design. Stream channel stabilization that involves sediment removal will increase the capacity of the channel, thereby reducing localized flooding.

e) Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff: **less-than-significant impact.**

Projects implemented under the Coastal Marin Permit Coordination Program do not contribute water to a storm drain system. Water may exit to roadside ditches from properties where projects are implemented but the projects will not increase the amount of runoff or decrease water quality as described in Sections a), c), and d) above.

f) Degradation of water quality: **less-than-significant impact.**

One of the stated purposes of the program is improvement in water quality. No project will be implemented that will result in long-term degradation. Best management practices described in Conditions to Avoid or Minimize Adverse Impacts section will be implemented to ensure that construction or maintenance activities for the conservation practices will not result in increases in turbidity in the stream (as measured by Nephelometric Turbidity Unit (NTU)) of more than 10% of the upstream background.

g) Housing in the floodplain: **no impact.**

No housing construction is authorized as part of this program.

h) Placement of structures in the 100-year flood hazard area that would impede or redirect flood flows: **less-than-significant impact.**

The program will place vegetative or rock structures designed to stabilize erosion in 100-year flood hazard areas. Most of these structures run parallel to watercourses and, therefore, do not pose a risk for redirecting flows away from the flood hazard area. In addition, structures for water control, such as culverts may be placed as part of the program. These structures will replace existing structures and will usually be larger, allowing more passage of flood flows. Sediment control basins may also be placed within the 100-year floodplain, although they will not be on the mainstem of creeks. The sediment control basin practice can be used to reduce concentrated off-site flow and associated erosion by metering out runoff following large storm events. Placement of structures that would impede flood flows is not authorized by this program.

i) Increase hazards from inundation by seiche, tsunami, or mudflow: **no impact.**

The conservation and restoration projects of the Marin Coastal Watersheds Permit Coordination Program do not pose a threat of causing inundation by seiche, tsunami, or mudflow, or being inundated.

j) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam: **less-than-significant impact.**

Failure of structures included in the permit coordination program poses little to no risk to life and property due to their small size and placement in rural agricultural areas. No significant amounts of water will be impounded.

Land Use and Planning

	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
X. Land Use and Planning: Would the project:				
a) Physically divide an established community?	☐	☐	☐	☒
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☐	☐	☒

Discussion:

a), b), & c) Divide an established community or conflict with land use plans and policies.

Not applicable to this project. The program will not alter existing land uses. However, it is anticipated that installation of the conservation and restoration practices will result in increased agricultural sustainability. Further, water quality improvements are expected to benefit recreation, commercial shellfish production, and commercial and recreational fishing. No habitat conservation plan currently exists in the program area, but if it did it would likely include the type of actions in the program as mitigation measures.

Mineral Resources

	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
XI. Mineral Resources: Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒

Discussion:

a) & b) Result in loss of mineral resources: **no impact.**

Not applicable to this program. Nothing in the program will alter the availability of mineral resources.

Noise

	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
XII. Noise: Would the project result in:				
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☐	☒
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☐	☒

	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
XII. Noise: Would the project result in:				
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☐	☒
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☐	☒
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

Discussion

a), b), c), & d) Exposure of persons to or generation of noise levels in excess of established standards, excessive groundborne vibration, increased ambient noise, temporary or periodic noise increases: **no impact.**

Temporary ambient noise levels in the project vicinity will not exceed existing noise generated by common agricultural management. Many ranchers currently use earthmoving equipment to retrieve eroded soil, smooth eroded landscape features, and conduct routine agricultural cultivation.

e) & f) In the vicinity of a public or private airstrip, expose people residing in the project area to excessive noise: **no impact.**

Marin County has a public airport at Gnoss Field and a private airport in San Rafael. Neither is located in or near in the program area.

Population and Housing

	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
XIII. Population and Housing: Would the project:				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

Discussion:

a), b) & c) Induce population growth, displace housing, or displace people: **no impact.**

The Marin Coastal Watersheds Permit Coordination Program will not directly or indirectly induce population growth, displace any existing housing or job supply. The project sites will be located in rural, agricultural areas.

Public Services

	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
XIV. Public Services: Would the project:				
a) Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
Fire protection?	☐	☐	☐	☒
Police protection?	☐	☐	☐	☒
Schools?	☐	☐	☐	☒
Parks?	☐	☐	☐	☒
Other public facilities?	☐	☐	☐	☒

Discussion:

a) Create adverse physical effects from increased need for government services: **no impact**.

The Marin Coastal Watersheds Permit Coordination Program will neither require any additional public services nor new governmental facilities.

Recreation

	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
XV. Recreation: Would the project:				
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒
b) Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?	☐	☐	☒	☐

Discussion:

a) Would the project increase the use of existing neighborhood and regional creating accelerated deterioation: **no impact**.

The Marin Coastal Watersheds Permit Coordination Program will not increase the use of any recreational facility.

b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment: **less-than-significant impact.**

Where improvements in recreational facilities support program goals of improved water quality and wildlife habitat, such improvements may be conducted as part of the program. Actions under the program might include rerouting a trail to avoid a listed plant or changing a wetcrossing to a bridge to keep livestock and humans out of sensitive habitat. These changes will improve the way recreation happens but will not increase recreational facility capacity or use, so no adverse environmental impacts are anticipated except the temporary construction impacts addressed elsewhere.

Transportation and Traffic

	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
XVI. Transportation and Traffic: Would the project:				
a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	☐	☐	☐	☒
b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?	☐	☐	☐	☒
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☐	☒
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒
e) Result in inadequate emergency access?	☐	☐	☐	☒

	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
XVI. Transportation and Traffic: Would the project:				
f) Conflict with adopted policies, plans or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?	☐	☐	☐	☒

Discussion:

Additional traffic associated with project construction is likely; however, the increase will be minor, temporary, and not exceed the capacity of the road system. The proposed conservation activities will reduce or eliminate many threats to traffic safety, such as sediment on roads, plugging of road culverts, and associated localized flooding. By reducing the likelihood of these traffic hazards, there will be less need for county public works crews and equipment to be on the roads to clean up sediment and flooding problems. Should work occur on a state highway, a road encroachment permit would be obtained from Caltrans. All conditions of that permit would be included in the landowner agreement and construction contract.

a) Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system**: No impact**.
When complete, the project will not impact traffic at all aside from the beneficial effects described above. During construction, there may be some additional traffic from construction worker commutes and construction trucks. However, these small-scale construction projects do not employ enough workers or generate enough truck traffic to change the existing traffic load in a noticeable way.

b) Exceed, either individually or cumulatively, a level of service standard**: Less-than-significant impact.**
Projects are located off main roads with good access from the existing ranch roads. Occasionally, work may occur within site of a public road, and curious drivers could then cause traffic slow-downs. Usually, roads in western Marin County, within the permit coordination area, are completely free flowing.

c) Result in a change to air traffic: **No impact**.
This project will not use or influence air traffic.

d) Substantially increase hazards: **No impact**.
This project will not change road structure or use patterns.

e) Result in inadequate emergency access: **No impact**.
This project will not affect emergency access.

f) Conflict with adopted policies or programs supporting alternative transportation**: No impact.**
This project will not influence public use of streets and will have no long-term effects on traffic on road use so it cannot affect alternative transportation.

Utilities and Service Systems

	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
XVII. Utilities and Service Systems: Would the project:				
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☐	☒
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☐	☒
e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☐	☐	☒

	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
XVII. Utilities and Service Systems: Would the project:				
g) Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	☐	☒

Discussion:

None of these projects involve in-building water systems or wastewater. They are in upland areas or adjacent to creeks. Generally, they are not involved with utilities and service systems.

a) & b) Exceed wastewater treatment requirements, require construction of new facilities or expansion of existing facilities for water or wastewater: **No impact**.

This project will not involve any additional flows to wastewater treatment facilities. It will not require any additional capacity of water systems or expansion of sources. There will be some water used during construction and for establishment period of plantings, but it will be a small portion of existing water uses on each property and will not require any expansion of existing sources.

c) Require construction or expansion of storm drains: **No impact**.

Program activities are designed to alter and improve hydrologic flows by improving channel configuration, increasing riparian vegetation to retain and slow stormwaters, and detaining or rerouting stormwaters to reduce erosion and run-off. Stormwater retention features in the designs may include increased sinuosity, step pools to work down steep slopes, outsloping and placement of rolling dips, inclusion of in-channel flood plains, and creation of grassy swales. These features are all above ground management of storm flow.

d) Require expansion of water entitlements: **No impact**.

The project will not require any change in public water systems. To improve water quality by keeping cattle out of the creek, the program involves some piping of water from existing riparian water rights to upland areas where it will be available in troughs. No extension of water rights is required..

e) Require additional wastewater treatment facilities: **No impact**.

The Marin Coastal Watershed Permit Coordination Program will not create wastewater, nor will it require wastewater treatment facilities.

f) & g) Be served by a landfill with sufficient capacity and comply with solid waste regulations**: No impact.**

The Marin Coastal Watersheds Permit Coordination Program will not create wastewater, nor will it require wastewater treatment facilities.

Mandatory Findings of Significance

	Potentially Significant Impact	Less than Significant with Mitigation	Less-than-Significant Impact	No Impact
XVIII. Mandatory Findings of Significance:				
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☐	☒	☐
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past, current, and probable future projects.)	☐	☐	☒	☐
c) Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☒	☐

Discussion:

The Marin Coastal Watersheds Permit Coordination Program will not degrade the quality of the environment, substantially reduce habitat for fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory. Such a potential does not exist because the program will be implemented in such a manner as to avoid short-term impacts to sensitive resources. The program has no potential to adversely impact cultural resources or human beings. The program does

not have the potential for adverse cumulative impacts. The program will result in improvement in water quality, natural habitat functioning, and agricultural sustainability.

REFERENCES

Association of Bay Area Governments (ABAG). 2010. Hazard Maps. Accessed online at: http://www.abag.ca.gov/bayarea/eqmaps/mapsba.html.

Bay Area Air Quality Management District (BAAQMD). 2000. Bay Area 2000 Clean Air Plan and Triennial Assessment.

Bay Area Air Quality Management District (BAAQMD). 2009. Bay Area Air Pollution Summary – 2008.

Bay Area Air Quality Management District (BAAQMD). 2010. Air Quality Standards and Attainment Status. Accessed online at: http://hank.baaqmd.gov/pln/air_quality/ambient_air_quality.htm.

California Department of Fish and Game (DFG). 1998. California Salmonid Stream Habitat Restoration Manual. 3rd Edition. Prepared by the Fisheries Resources and Species Management Department: Gary Flosi, Scott Downie, James Hopelain, Michael Bird, Robert Coey and Barry Collins.

California Department of Transportation. 2010. California Scenic Highway Mapping System. Accessed online at: http://www.dot.ca.gov/hq/LandArch/scenic_highways/index.htm.

Essig Museum of Entomology. 2010. California's Endangered Insects. University of California, Berkeley. Accessed online at: http://essig.berkeley.edu/endins/exhibit.htm.

Kadyszewski, John. 2004. What is Terrestrial Carbon Sequestration? Winrock International, presentation at West Coast Carbon Partnership Annual Meeting.

Marin Municipal Water District (MMWD). 2008. Lagunitas Creek Salmon Spawner Survey Report 2007-2008.

Moyle, P.B., Israel, J.A. and Purdy, S.E. 2008. SOS: California's native fish crisis: Status of and solutions for restoring our vital salmon, steelhead and trout populations. California Trout, San Francisco, CA.

National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries). 1996. Juvenile Fish Screen Criteria for Pump Intakes.

National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries). 2001. Fisheries Water Drafting Specifications.

Natural Resource Conservation Service (NRCS). 2010. Field Office Technical Guide Practice Standards and Specifications. United States Department of Agriculture. Accessed online at: http://efotg.sc.egov.usda.gov/references/public/CA/Sec1TitlePage.pdf.

Natural Resource Conservation Service (NRCS). National Engineering Handbook. United States Department of Agriculture.

Natural Resource Conservation Service (NRCS). 1997. Engineering Field Manual. United States Department of Agriculture.

Prunuske Chatham, Inc. (PCI). 2010. San Geronimo Valley Salmonid Enhancement Plan. Prepared for Marin County Community Development Agency.

Serpa, Larry. 1996. California Freshwater Shrimp: A Ghost-like Crustacean We Can't Afford to Lose. Tideline Vol.16 No. 2 1-3.

Stadnyk, Christine. 2010. Root Dynamics and Carbon Accumulation of Six Willow Clones in Saskatchewan. Department of Soil Sciences, University of Saskatchewan.

Tomales Bay Watershed Council. 2010. The Tomales Bay Watershed Environment. Accessed online at: http://www.tomalesbaywatershed.org/watershed.html.

Mander, Ulo, Krista Lohmus, Sille Teiter, Veiko Uri, and Jurgen Augustin. 2008. Gaseous nitrogen and carbon fluxes in riparian alder stands. Boreal Environment Research 13 (231-241).

U.S. Environmental Protection Agency (EPA). 2010. Six Common Air Pollutants. Accessed online at: http://www.epa.gov/air/urbanair/

U.S. Environmental Protection Agency. 2010a. Clean Energy Calculations and References. Accessed at http://www.epa.gov/cleanenergy/energy-resources/refs.html

U.S. Fish and Wildlife Service (USFWS). 2010. Species Accounts. Accessed online at: http://www.fws.gov/sacramento/es/animal_spp_acct/acctbug.htm.

University of California Cooperative Extension (UCCE). 2010. Riparian Zone Management Plan. August 2010.

Xerces Society. 2010. San Bruno Elfin Butterfly. The Butterfly Conservation Initiative. Accessed online at: http://www.butterflyrecovery.org/species_profiles/profiles.php?id=16.

ACRONYMS USED IN THIS DOCUMENT

ABAG	Association of Bay Area Governments
BAAQMD	Bay Area Air Quality Management District
BMP	best management practice
CalEPA	California Environmental Protection Agency
CARB	California Air Resources Board
CDFG	Department of Fish and Game
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CFS	California freshwater shrimp
CRLF	California red-legged frog
dbh	diameter at breast height
DPW	Marin County Department of Public Works
DTSC	California Department of Toxic Substances Control
EPA	U.S. Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
ESA	Endangered Species Act
ESHA	environmentally sensitive habitat
FIGR	Federated Indians of Graton Rancheria
FOTG	Field Office Technical Guide Practice Standards and Specifications
ISC	Initial Study Checklist
JARPA	Joint Aquatic Resources Permit Application
LCP	Local Coastal Plan
MALT	Marin Agricultural Land Trust
Marin RCD	Marin Resource Conservation District
MMWD	Marin Municipal Water District
MND	Mitigated Negative Declaration
MOA	Memorandum of Agreement
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
NOAA Fisheries	National Oceanic and Atmospheric Administration's National Marine Fisheries Service
NPS	National Park Service
NRCS	U.S. Department of Agriculture Natural Resources Conservation Service
NTU	Nephelometric Turbidity Unit
NWP	Nationwide Permit
OHWM	ordinary high water mark
PCI	Prunuske Chatham, Inc.
PCP	Marin Coastal Watersheds Permit Coordination Program

PRC	California Public Resources Code
PRNS	Point Reyes National Seashore
RCD	Resource Conservation District
RTE	Rare, Threatened, or Endangered
RWQCB	Regional Water Quality Control Board
RZMP	Riparian Zone Management Plan
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
STRAW	Students and Teachers Restoring a Watershed
TAC	Technical Advisory Committee
TMDL	total maximum daily load
UCCE	University of California Cooperative Extension
USFWS	United States Fish and Wildlife Service

Appendix 1: Riparian Zone Management Plan

Riparian Zone Monitoring Plan

Prepared for:

Marin Resource Conservation District
P.O. Box 1146, Point Reyes Station CA 94956
(415) 663-1170, http://www.marinrcd.org/

Prepared by:

University of California Cooperative Extension
1682 Novato Boulevard Suite 150-B, Novato CA 94947
(415) 499-4204, http://cemarin.ucdavis.edu/

August 2010

Acknowledgements

Thank you to the San Francisco Bay Regional Water Quality Control Board, State Water Resources Control Board and American Recovery & Reinvestment Act for providing the financial resources to produce this document. Our gratitude goes to the many landowners and land managers who invested time and money to voluntarily implement conservation practices over the year while providing local food. Many generously shared information about the history of specific changes to local streams and riparian areas as well as practical and theoretical questions regarding the long-term outcomes from natural resource conservation. We truly appreciate the life-long stewardship and commitment to the land that is common among community residents.

Contributors

This plan was the result of contributions from numerous local professionals. Specifically, the following partnering organizations helped to produce this document:

- USDA Natural Resources Conservation Service
- The Bay Institute's Students & Teachers Restoring A Watershed
- Point Reyes Bird Observatory Conservation Science
- Prunuske Chatham, Inc.
- Jeff Creque, Certified Rangeland Manager
- Marin Agricultural Land Trust
- San Francisco Bay Regional Water Quality Control Board
- Southern Sonoma County Resource Conservation District
- California Department of Fish and Game
- Point Reyes National Seashore
- Marin Municipal Water District
- The Nature Conservancy

Suggested Citation

Lennox, M., N. Scolari, and D. Lewis. 2010. Riparian Zone Monitoring Plan. Prepared by University of California Cooperative Extension for Marin Resource Conservation District, Point Reyes Station CA. 75 p.

Project Summary

The conservation of natural resources and agricultural viability has been the focus of the Marin Resource Conservation District (RCD) for 50 years. Delivering financial and technical support with partnering organizations to landowners has evolved over the last half century in the face of increased demand for stream restoration and locally produced food. Responding to societal needs and explaining the long-term outcomes from natural resource enhancement efforts has continued to be a challenge for agriculture.

Assisting landowners to meet their needs has changed as watershed and creek management issues, such as water quality, are increasingly problematic. Solutions for controlling erosion and managing the corridor along streams have improved since the 1970's. Marin RCD and its partners have pioneered advances in riparian restoration technology and now provide concise, scientific approaches to watershed restoration based on site conditions.

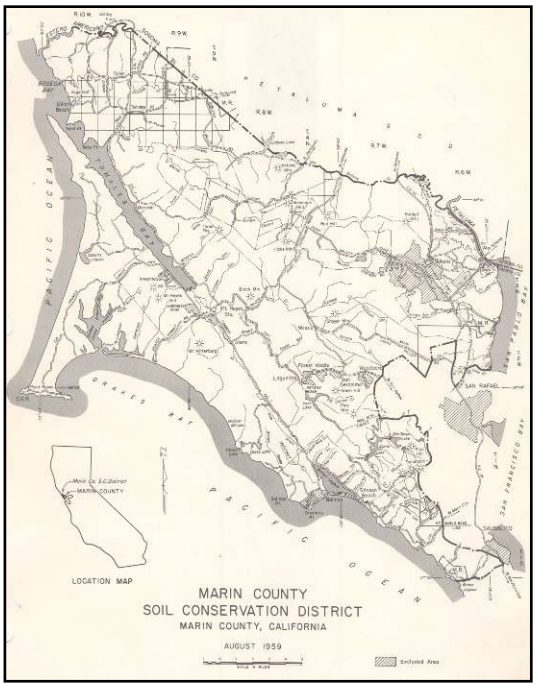
This Riparian Zone Monitoring Plan (RZMP) is for conservation projects implemented in riparian areas targeted in watershed recovery efforts to control erosion and sedimentation, increase aquatic, riparian, and upland habitat and stabilize eroding stream channels. The RZMP applies to any stream from headwater creeks or gullies to large streams or small rivers. Its goal is to provide funding and permitting agencies the confidence that projects are systematically monitored while guiding Marin RCD staff and partners to efficiently collect and report monitoring results for integration with the Permit Coordination Program (MRCD 2004).

Overall, the RZMP provides a science-based guide to organize post-project monitoring based on site-specific objectives to further understand agricultural sustainability and ecosystem services. It standardizes monitoring protocols and prioritizes questions for periodic evaluation. Consistent and systematic monitoring of project outcomes will continue to improve conservation practices while maintaining landowner confidentiality. Marin RCD's watershed restoration program is built upon the hard work by community residents, landowners, ranchers, farmers, consultants, restoration practitioners, agencies, scientists, oyster growers, and other stakeholders.

Table of Contents

INTRODUCTION 5
CONSERVATION PRACTICES, PROJECT OBJECTIVES & MONITORING TYPES 8
Partners & Collaboration 8
Permit Coordination & Conservation Practices 9
Monitoring Types & Project Objectives 11
MONITORING COMPONENTS & STRUCTURE 15
Monitoring Attributes, Targets & Protocols 15
Project Planning 15
Implementation Monitoring 18
Effectiveness Monitoring 20
Validation Monitoring 28
Monitoring Tasks, Timing & Partner Roles 30
Data Management & Reporting 33
Privacy 33
Landowner Reports 33
Reports to Funders 34
Programmatic Review 34
Monitoring Resources Required 34
SUMMARY 36
REFERENCES 37
APPENDIX A: PROJECT PLANNING & IMPLEMENTATION FORMS 49
Project Objectives & Targets 50
Monitoring Plan Checklist 51
Photo-Point Monitoring 52
Project Site Sketch 53
Revegetation Data 54
APPENDIX B: QUALITATIVE MONITORING FORMS 55
Project Assessment Checklist 56
Project Assessment Checklist Guide 58
Landowner Questionnaire 60
Revegetation Survival 62
APPENDIX C: QUANTITATIVE EFFECTIVENESS MONITORING FORMS 63
Sediment Load Estimates 64
Sediment Load Estimates Guide 66
Streambank Stability Line Intercept Transect 71
Riparian Line Intercept Transect 72
Aquatic Habitat 73
Stream Shade 74
Channel Dimensions 75

INTRODUCTION



The mission of the Marin RCD is to conserve and enhance Marin County's natural resources, including its soil, water, vegetation, and wildlife. The RCD has administered approximately $12 million of government and private foundation grants since its inception in 1959 while providing technical and other financial resources. Today, the RCD continues to bring together state, federal, and local agencies with private landowners to conserve soil and water resources. Conservation projects focus on:

- Control of soil erosion
- Riparian habitat restoration
- Protection and improvement of water quality
- Education and outreach
- Conservation of rangeland, cropland, and forestland
- Active support of the district's agricultural economy and heritage

The purpose of riparian enhancement and watershed conservation is to implement management practices that improve water quality by reducing sediment, pathogen or nutrient levels in storm runoff and increase habitat for wildlife, birds or fish. The links between streambank erosion, water quality, and fish and wildlife habitat are a concern for agricultural production and environmental conservation. The RCD seeks to improve natural resources, minimize non-point source pollution such as the erosion of topsoil or fine sediment, and implement healthy land management practices on Marin County farms.

The need to monitor conservation and restoration project outcomes has received increased critical attention in recent years from both the popular press (Dean 2008) and the scientific literature (Christian-Smith and Merenlender 2010). This is partly because few long-term assessments have been completed. Riparian and watershed enhancement practices in particular have received minimal documentation considering over $2 billion has been spent on these efforts in the United States (Bernhardt et al. 2005, 2007). As a result, numerous researchers have questioned project success (Dean 2008, Palmer et al. 2005), while others have produced monitoring methods or guidance (Harris et al. 2005a, Harris et al. 2005b, Thayer et al. 2005, Kondolf and Micheli 1995), and evaluated project outcomes (Lennox et al. 2011, Tompkins and Kondolf 2007, Opperman and Merenlender 2004).

Multiple grant opportunities currently require some degree of project monitoring; however, few funding opportunities offer long-term contract agreements to implement project monitoring over five years (Reeve et al. 2006, Reeve and Towey 2007). Securing adequate funding will be an ongoing challenge to complete the specifics detailed in the following plan. As a result, fast assessments efficiently evaluate all project sites and intensive, quantitative protocols follow a subset of project sites depending on available funding.

The objective of this Riparian Zone Monitoring Plan (RZMP) is to organize and standardize an efficient process to document short and long-term project outcomes in order to evaluate and

improve the management practices utilized by Marin RCD. The plan focuses on the following fundamental questions:

1) Are projects performing as planned and satisfying landowner concerns?
2) Are long-term project objectives being accomplished?
3) How can project planning, design, implementation, maintenance, and adaptive management be improved to ensure success at each site?
4) How can monitoring data be efficiently shared between RCD partners and reported to funders while maintaining client confidentiality and educating the public about conservation practices?

Landowner observations and permission to monitor sites are critical to understand project outcomes over multiple decades (Figure 1). The greatest benefit resulting from monitoring is having a jump-start on adaptive management needs which leads to greater project success. Project evaluations may also be included in Ranch Water Quality Plans to meet regulatory requirements (SFBRWQCB 2009). Incorporating the lessons learned from previous projects has helped to fine-tune future projects for permit, funder and landowner requirements. This has become an incentive for landowners and increased participation in natural resource conservation and stewardship (MRCD 2004). A well planned and coordinated monitoring program provides for numerous other opportunities, such as greater power to leverage grant funds for implementing more conservation projects, assessing landowners' satisfaction, and educating the public. The RZMP formalizes this feedback loop by documenting how design, installation and maintenance leads to effective projects on the ground.

Figure 1: Photo-point sequence of riparian revegetation project site at a tributary to Walker Creek documents the vegetation response at zero (A), two (B), eight (C), and twelve years (D) since project implementation.

The following plan lays out a step-by-step process for data collection, analysis and reporting that begins before project implementation. This allows Marin RCD and its partners the capacity to lead how project effectiveness is measured in order to provide consistency over time for useful and meaningful results. The methods were compiled from the scientific literature and grant

funders can have greater confidence in Marin RCD's restoration program to document expected and unintended outcomes beyond the contract period.

This document provides a guide to organize project monitoring based on site-specific objectives by focusing on the commonly utilized conservation practices and those outlined in the Marin Coastal Watershed Permit Coordination Program (PCI 2010). The RZMP components were a collaborative effort among Marin RCD partners with field-testing conducted at numerous project sites from 2008 to 2010. Overall, the RZMP standardizes monitoring protocols, streamlines the reporting process among partners and prioritizes questions for periodic evaluation and analysis.

CONSERVATION PRACTICES, PROJECT OBJECTIVES & MONITORING TYPES

Partners & Collaboration

The Marin RCD collaborates with numerous local natural resource professionals to provide landowners a broad base of expertise, skills and experience when implementing conservation projects. Marin RCD partners use a watershed approach to conservation by integrating ecology, sociology and geology to evaluate the aggregate effects of current and historic land use. The goal is to provide an objective and scientific basis to treat the underlying causes of environmental problems instead of the symptoms.

Landowner participation is important for the success of each project and for restoration to succeed in privately owned watersheds overall. Conservation projects start with an interested landowner that contacts Marin RCD staff to request assistance in addressing environmental concerns or implementing specific practices. The planning and design of specific project practices follows the guidance of locally experienced restoration professionals (MRCD 2004). Landowner interest, participation and satisfaction have been found to be critical for Marin RCD projects to be successful. When a landowner is willing and dedicated to project stewardship, they can make it a success through sheer determination. Basically, investment equals outcome. Marin RCD and partners build upon this land stewardship ethic to focus time and resources because of landowners' critical role in conservation. Aldo Leopold explained the philosophy of conservation over 70 years ago in Sand County Almanac.

> *"The land ethic simply enlarges the boundaries of the community to include soils, waters, plants, and animals, or collectively: the land.... In short, a land ethic changes the role of Homo sapiens from conqueror of the land-community to plain member and citizen of it. It implies respect for his fellow-members, and also respect for the community as such."* (Leopold 1949)

Multiple roles are filled among Marin RCD partners to plan, implement and monitor each conservation project. The partnership with the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) offers technical and financial assistance to help solve natural resource challenges, which often maintains or improves long-term economic viability. The technical support provided by the NRCS to agricultural operators is based on conservation systems and plans designed to sustain and improve soil and water quality (MRCD 2004, 2009).

Other Marin RCD partners provide numerous benefits to conservation and land management in the County. Consulting firms prioritize sediment reduction opportunities, obtain permits, design projects, engineer specifications, and conduct construction monitoring for Marin RCD. The Bay Institute's Students And Teachers Restoring A Watershed (STRAW) educates hundreds of students about agricultural viability and watershed ecology while installing thousands of native plants each year (Figure 2). STRAW monitors the survival and establishment of their plantings. Point Reyes Bird Observatory (PRBO) assesses bird populations at stream restoration sites over time and shares their results with participating landowners. The University of California Cooperative Extension (UCCE) conducts monitoring research while providing publications and workshops. These groups collaborate to offer resources to local agriculture along with other

government and private organizations such as the Marin County Agricultural Commissioner, Marin Agricultural Land Trust and Farm Bureau.

Figure 2: A gully site pre-project (left) and the STRAW revegetation day implementing critical area planting practice (right) following spring development and grade stabilization structures. Control fencing was constructed after the planting was completed.

Water quality monitoring of Marin County streams has been conducted by numerous agencies and groups over the years including California Department of Fish and Game, Regional Water Quality Control Board (RWQCB) and others. The Sonoma-Marin Farm Bureau's Animal Resource Management Committee provides a water quality monitoring service for dairy operations assessing nutrients. Currently, the Tomales Bay Watershed Council conducts long-term monitoring for pathogens in streams flowing to Tomales Bay (TBWC 2003). NRCS, UCCE, Marin RCD and Southern Sonoma County RCD collaborated to monitor nutrient and sediment concentrations during storms from 2004-2006 for evaluating the effectiveness of conservation practices on water quality in the Stemple Creek Watershed (USDA 2005). The large-spatial and temporal variations in water quality dictate such monitoring be conducted intensively and systematically across numerous sites.

Since water quality and fisheries of the Tomales Bay Watershed are being evaluated by other organizations, the RCD monitoring program focuses on the effectiveness of projects at the site or ranch scale. Such effectiveness monitoring of beneficial or Best Management Practices (BMP) is the type of evaluation required by the RWQCB's Conditional Grazing Waiver for Tomales Bay (SFBRWQCB 2009), provides feedback to improve practices, identifies the need for future projects, and offers education opportunities. Though the RCD does not regularly monitor water quality, exceptions have been made to measure the quantity of flow from spring developments or for other project-specific reasons and hydrology professionals will continue to be consulted. Given the large amount of scientific research documenting how vegetation affects storm water runoff, this RZMP details how vegetation will be monitored at a project site to document expected water quality improvements for sediment, nutrient and pathogen pollutants.

Permit Coordination & Conservation Practices

The Marin RCD steadily works with private landowners to implement conservation projects has been shown by their steady and consistent participation. A growing number of landowners in the coastal watersheds of Marin County are interested in restoring streams or enhancing other natural resources on their property (Prunuske et al. 1994, PCI 2001, MRCD 2004). However, the regulatory review processes that were intended to protect natural resources has acted as a disincentive to voluntary efforts reducing nonpoint source pollution and enhancing habitat. As a

result, the Marin RCD created the Marin Coastal Watershed Permit Coordination Program (PCP) (MRCD 2004), conducted a five year review (MRCD 2009), and is currently updating the PCP (PCI 2010).

The Permit Coordination Program (PCP) provides the catalyst for high quality erosion control and habitat restoration throughout the Tomales Bay watershed. It is based on a model of coordinated, multi-agency project oversight and review that ensures the integrity of agency mandates but makes permitting for stream enhancement accessible to farmers and ranchers. Through the PCP, Marin RCD and partners work directly with landowners to promote voluntary actions that will improve water quality and wildlife habitat values in the Stemple, Walker, and Tomales Bay watersheds (Figure 3).

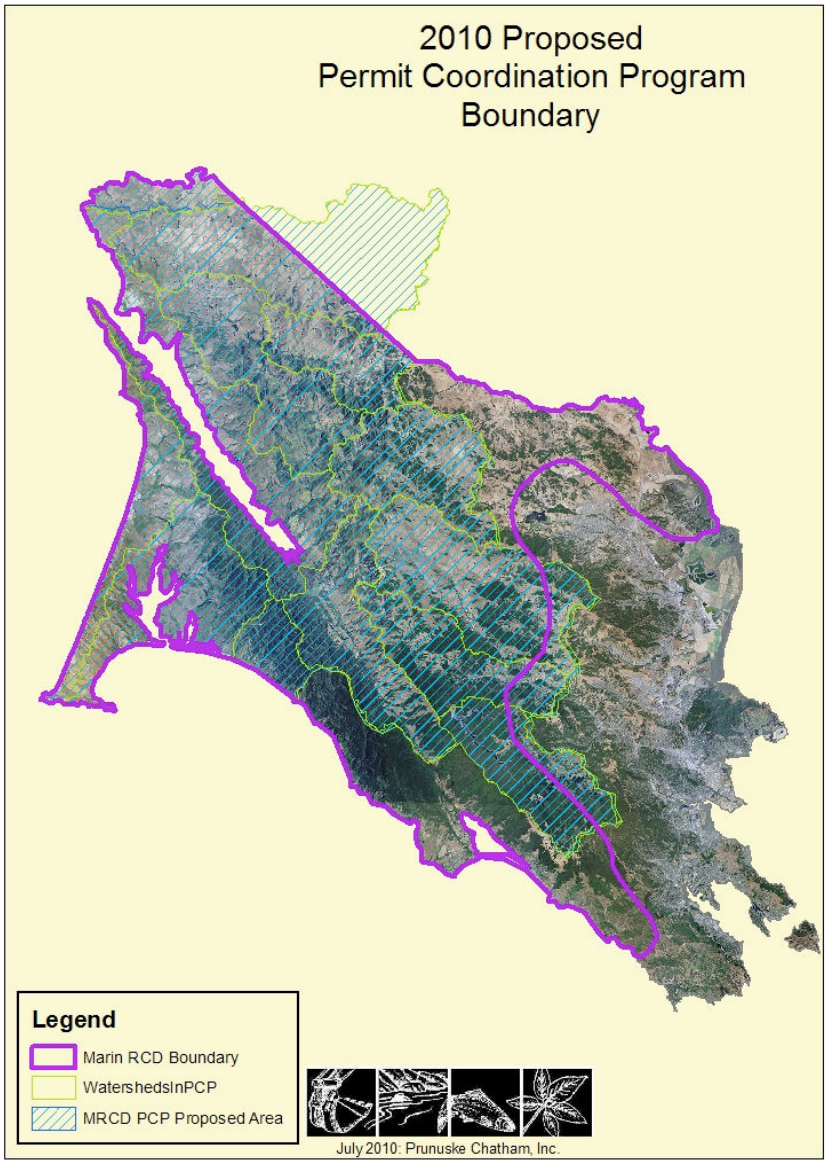


Figure 3: Map of previous (2004) and proposed (2010) Permit Coordination Program (PCP) area.

The PCP applies to the conservation practices that require more intensive permit review. The following 17 conservation practices were modified to fit local conditions for use by Marin RCD and its partners with detailed specifications available in the PCP (PCI 2010):

1) Access road,
2) Animal trail & walkway,
3) Critical area planting,
4) Filter strip,
5) Fish passage,
6) Stream habitat improvement & mngt.,
7) Grade stabilization structure,
8) Grassed waterway,
9) Lined waterway,
10) Pipeline,
11) Sediment basin,
12) Spring development,
13) Streambank protection,
14) Stream channel stabilization,
15) Structure for water control,
16) Underground outlet,
17) Water & sediment control basin,

Multiple practices are often combined at a single project site. For example, a riparian revegetation project may include critical area planting, stream bank protection and stream channel stabilization practices. Three additional practices are commonly used:

18) Fencing, http://efotg.nrcs.usda.gov/references/public/CA/382std-04-07.pdf
19) Watering facility, http://efotg.nrcs.usda.gov/references/public/CA/614std-09-07.pdf
20) Prescribed grazing, http://efotg.nrcs.usda.gov/references/public/CA/528std-6-08.pdf

NRCS technical standards, specifications, and operations/ maintenance documents for these and other conservation practices are available from the office in Petaluma and on the internet (http://efotg.nrcs.usda.gov/efotg_locator.aspx?map=CA). To download the information, use the map to select the county, wait for a few seconds, go to Section IV-B of the electronic Field Office Technical Guide, and choose the practice desired (USDA 2010a).

Monitoring Types & Project Objectives

The monitoring conducted for each project depends on the specific objectives and expected changes at the site; however, certain types of monitoring are done at all project sites. Numerous documents describe methodologies and three types of post-project monitoring are common (Lewis et al. 2009, Roni 2005). The common project objectives used by Marin RCD are described below to facilitate a systematic planning process for how to monitor each project site.

Project Planning is the start of the monitoring process in order to have the resources and time available to collect data before the project is installed. During planning, documentation of current site conditions occurs to support project selection, objectives, design, and funding. The most important step in monitoring conservation project is to document objectives on a site-by-site basis. This guides the attributes monitored for quantitative effectiveness purposes, and needs to begin prior to project implementation. For example, project objectives may include the success of plantings, aquatic habitat condition, native tree cover, and all three are often combined. Refer to the PCP for detailed information about the planning process (PCI 2010).

The first post-project monitoring type is Implementation Monitoring to confirm *what was done, where is it located, did it live, and is the landowner satisfied?* Marin RCD's Construction Monitoring coordinates design engineers with field inspectors to facilitate proper project implementation and address contractors' concerns or questions immediately (MRCD 2009, PCI 2010). This ensures that the project was installed according to the approved designs, plans, permits and landowner agreements. Common implementation monitoring objectives include:

1) *Completed practices location* – Document the extent and location of practices at each site.
2) *Satisfy landowner concern* – The landowner's reasons to implement the project are satisfied.
3) *Revegetation survival* – Survivorship of planted vegetation meets the target for the project site or replanting is done.

Second is Effectiveness Monitoring, which assesses changes in site conditions over time to document outcomes resulting from the implemented project. *Did attributes or components at the project site change in magnitude as expected over the appropriate time frame?* The qualitative methods provide a broad assessment of project site conditions, but the data is less comparable following 10 to 20 years (Kocher and Harris 2005). Qualitative monitoring is able to rapidly identify a range of concerns at each project site that might not be detected by a more narrowly focused quantitative approach (Kocher and Harris 2005). Qualitative monitoring uses photographs, interviews, counts, and effectiveness ratings (excellent, good, fair, poor, or fail) at the majority of project sites. For example, the Project Assessment Checklist combines implementation and effectiveness evaluations in a two-page form (Appendix B). The most common qualitative tool is photo-point monitoring (Figures 1 and 2). Survivorship monitoring is considered semi-quantitative (Harris et al. 2005b) and is organized with the qualitative protocols in Appendix B.

Qualitative and quantitative monitoring attributes each have their purpose and compliment each other in Marin RCD's monitoring program. Quantitative monitoring approaches often use transects with a tape measure, hip chain, or other means to systematically assess change in project site characteristics (Figure 4). It provides objective data that is less subject to varying interpretations of project outcomes, but more time is necessary to survey transects repeatedly. Quantitative approaches include estimates of sediment saved at 100% of relevant projects and formal transects on a subset of project sites (25%) often include canopy cover or streambank stability over 10-20 years. They are surveyed before and after project implementation to document a trajectory for when targets are reached. Quantitative methods are also used to calibrate qualitative approaches by statistically correlating the two and comparing the change over time with trend and trajectory analysis.

Common effectiveness monitoring objectives include:

1) *Benefit ranch/farm viability and/or productivity*:
   a. *Improve/preserve farm field productivity* – The production from pasture, agricultural field, or ranch/farm system is improved or maintained.
   b. *Improve livestock management* – The moving/handling or welfare/health of livestock is improved or maintained.
   c. *Conserve on-farm water use* – Less water is used in farm/ranch operations.
2) *Reduce/prevent sediment erosion/ delivery* – Soil/fine sediment is stabilized and erosion is controlled as indicated by reducing sediment loads and increasing streambank stability/ground cover. Mercury pollution control is linked to erosion control of Walker Creek floodplain sediments, and effectiveness monitoring is the same for both objectives.

3) *Reduce/prevent pathogen or nutrient delivery* – Sources of nutrients or pathogens are prevented from entering the stream as indicated by increasing ground cover and Residual Dry Matter (RDM) at a site.

4) *Improve/preserve riparian habitat* – Increase or protect native woody or herbaceous vegetation cover and diversity along the stream while controlling or reducing invasive exotic plant species.

5) *Improve/preserve aquatic habitat* – The habitat available for aquatic species in the stream (fish, amphibians, invertebrates) is improved or protected as indicated by increasing pool depth, stream shade, woody debris, upstream access, etc.

Figure 4: Quantitative monitoring along transects for vegetation and bank/channel stability cover using tape measure (left), aquatic habitat survey using hip chain, (middle), and cross-section channel dimensions stadia rod/line level/tape measure (right).

The third post-project monitoring type is Validation Monitoring to confirm the cause and effect relationship between the project and biotic (fish or wildlife) or physical (water quantity or quality) response. For example, this includes the change in habitat use, presence, or abundance of migratory songbirds or salmon and steelhead trout at the project site. These attributes are often controlled by landscape-scale factors such as upstream land use or the proximity of desired wildlife to the project site. Validation monitoring is coordinated with effectiveness efforts at the same project sites and needs to occur over a sufficient period of time for wildlife use or water quality to change as a result of the conservation practices. *Did wildlife (e.g. birds), fish, or water (e.g. temperature) respond to the changes in physical or biological attributes brought about by the project?* Common Marin RCD validation monitoring objectives include:

1) *Increase/ preserve terrestrial wildlife abundance/ diversity* – The habitat use by terrestrial wildlife, such as native birds, is greater or preserved as a result of the project(s) indicated by population abundance or diversity.

2) *Increase/ preserve aquatic species abundance/ diversity* – The habitat use by native aquatic fauna (fish, amphibians, invertebrates) is greater or preserved as a result of the project(s) indicated by population abundance, presence or diversity.

3) *Improve/ preserve water quantity/ quality* – The amount or condition of water such as storm runoff, waste water, spring development, or stream flow is improved or preserved as a result of the project(s).

Similar across all monitoring types is an opportunity to identify and address threats to project success at the site into the future. In addition, some objectives pertain to all practices while others are specific to certain practices (Table 1).

Table 1: NRCS conservation practices most commonly used by Marin RCD matched with potential project objectives (shaded). Other objectives may be added.

Conservation Practice (NRCS code)	Project Objective										
	Completed practices location	Landowner concern satisfied	Reveg. survival	Benefit/ sustain farm viability/ productivity	Reduce/ prevent sediment erosion/ delivery	Reduce/ prevent pathogen or nutrient delivery	Improve/ preserve riparian habitat	Improve/ preserve aquatic habitat	Increase/ preserve terrestrial wildlife abundance/ diversity	Increase/ preserve aquatic species abundance/ diversity	Improve/ preserve water quantity/ quality
	Implementation			Effectiveness					Validation		
Access road (560)	■	■		■							
Animal trail/ walkway (575)	■	■		■							
Critical area planting (342)	■	■	■		■	■	■	■	■	■	■
Fencing (382)	■	■		■	■	■	■	■	■	■	■
Filter strip (393)	■	■	■	■	■	■					
Fish passage (396)	■	■			■						
Stream habitat improvement/ mngt. (395)	■	■	■		■	■	■	■	■	■	■
Grade stabilization structure (410)	■	■	■	■	■		■	■	■	■	
Grassed waterway (412)	■	■	■	■	■						
Lined waterway/ outlet (468)	■	■		■	■						
Pipeline (516)	■	■		■		■					
Prescribed Grazing (528)	■	■		■	■	■	■	■	■	■	■
Sediment basin (350)	■	■			■			■			■
Spring development (574)	■	■		■			■	■			
Stream channel stabilization (584)	■	■	■	■	■	■	■	■	■	■	■
Streambank protection (580)	■	■	■	■	■	■	■	■	■	■	■
Structure for water control (587)	■	■		■	■	■		■			
Underground outlet (620)	■	■		■	■	■					
Water & sediment control basin (638)	■	■			■	■		■	■	■	■
Watering facility (614)	■	■		■	■	■	■	■	■	■	■

MONITORING COMPONENTS & STRUCTURE

This section provides specific detail on how riparian enhancement project sites and associated conservation practices are monitored by Marin RCD and its partners using existing scientific protocols. Information is gathered from participating individuals and landowners to ascertain how projects positively or negatively impacted ranch operations and viability. The timing of monitoring visits, coordination, data management, reporting, and required resources are also covered in this section.

Monitoring Attributes, Targets & Protocols

The attributes monitored depend on the specific objectives at each site. As a result, monitoring begins during project planning before implementation by organizing project objectives, prioritizing their importance, and estimating the time expected to reach target values. The target values included represent biologically significant thresholds based on the scientific literature that indicate the improved habitat conditions will benefit fish, wildlife, water quality, or all three. The targets should be reviewed with the PCP in five years to assess their importance and achievability. The targets are not mandatory programmatic goals and offer working expectations, or hypotheses, for RCD partners to discuss further. Implementation and effectiveness monitoring are the focus for RCD staff with specific forms provided in the appendices. Validation monitoring is being conducted by RCD partners.

Project Planning

Pre-project site evaluations provide information for objectives, project selection, budget estimates and permit needs. A few organizational steps begin before conservation projects are implemented that guide and facilitate the post-project monitoring for each site. The Permit Coordination Program (PCP) describes this process in detail (PCI 2010).

An easy and fast tool to help landowners prioritize project sites within a ranch is available for ranches in west Marin. The Ranch Water Quality Plan Template (SFWQCB 2009) was the product of collaboration among multiple agencies (California Cattelmen's Association, Marin Farm Bureau, Western United Dairymen, Marin RCD, NRCS, MALT, RWQCB, Point Reyes National Seashore and Marin Organic) to comply with Conditional Grazing Waiver regulations related to the Tomales Bay Total Maximum Daily Load (TMDL). The Ranch Plan Template provides pasture and stream checklists to identify areas on the ranch to work on and potential conservation practices needed, which helps to secure funding for fixing historic and legacy sites. The better a landowner is able to describe their needs and ranch plans the better their chances when competing for limited financial resources from NRCS, RCD, or other groups.

The first and most important step in project monitoring is to document objectives on a site-by-site basis once the project has been approved by the RCD Board of Directors. The commonly used objectives listed in Table 1 offer a guide to completing the Project Objectives form in Appendix A, but site-specific potential and limiting factors need to be considered. Project objectives may include the success of plantings (implementation monitoring), the attainment of certain habitat conditions (effectiveness monitoring), or both, and data collection at the project site is conducted accordingly. Note the priority of each compared to the other objectives selected. Also, estimate the target value if applicable and how long (# of years) until each target is expected to be achieved using the professional judgment of RCD partners and restoration trajectory research such as Lennox et al. (2011). Try to keep the targets both realistic and

meaningful with periodic evaluations during PCP and programmatic reviews. Keep in mind validation monitoring objectives require significantly greater expertise and resources.

The Monitoring Plan Checklist form is an organizational guide that begins once the project objectives are set (Appendix A). Potential monitoring forms are listed based on when each is used in the project timeline – pre-project, post-project for grant reports, and long-term quantitative protocols (Table 2). The frequency that each protocol is used, a summary of each, and space for noting when monitoring was done are included on the Checklist.

Table 2: Monitoring forms listed according to common project objective to facilitate developing the monitoring plan for each project site. The phase in the project timeline when to use each form and the goal for percent of project sites are included.

Monitoring Form/ Protocol (with location)	Project Objective											Percent of Project Sites
	Completed practices location	Landowner concern satisfied	Reveg. survival	Benefit/ sustain farm viability/ productivity	Reduce/ prevent sediment erosion/ delivery	Reduce/ prevent pathogen or nutrient delivery	Improve/ preserve riparian habitat	Improve/ preserve aquatic habitat	Increase/ preserve terrestrial wildlife abundance/ diversity	Increase/ preserve aquatic species abundance/ diversity	Improve/ preserve water quantity/ quality	
	Implementation			Effectiveness					Validation			
Pre-project:												
Objectives/ Targets (Appx. A)	■	■	■	■	■	■	■	■	■	■	■	100%
Monitoring Plan Checklist (Appx. A)	■	■	■	■	■	■	■	■	■	■	■	100%
Post-project completed for grant reports (2-3 years):												
Map/ Site Sketch (Appx. A)	■	■										100%
Revegetation Data (Appx. A)	■	■	■									100%
Project Assessment Checklist (Appx. B)	■	■	■	■	■	■	■	■				100%
Landowner Questionnaire (Appx. B)		■		■								100%
Revegetation Survival (Appx. B)			■									100%
Pre-project, post-project, for grant reports & repeated over time as funding allows:												
Photo-points (Appx. A)	■	■	■		■	■	■	■	■	■		100%
Sediment Load Estimates (Appx. C)					■		■	■				100%
Streambank Stability Line Intercept Transect (Appx. C)					■	■	■	■				25%
Riparian Line Intercept Transect (Appx. C)					■		■					25%
Aquatic Habitat (Appx. C)					■		■	■		■		25%
Stream Shade (Appx. C)							■	■	■	■		25%
Tag Lines (Weaver et al. 2005 - p. 40)								■				25%
Bird Populations (Ralph et al. 1993, 1995)									■			25%
As needed for certain projects (pre-project, post-project, & repeated):												
Channel Dimensions: cross-sections, long. profile (Appx. C)					■			■				5%
Maintenance & Event (Weaver et al. 2005 - p. 79)					■							5%
Water Quantity/ Quality (SWRCB 2001, MacDonald et al. 1991)					■	■		■			■	5%
Fish Passage (Collins 2009, Stockard and Harris 2005)								■		■		5%
Fish Populations (Duffy 2005, Dolloff et al. 1993)							■	■		■		5%
Freshwater Shrimp (Fong and Vandenberg 1998)							■	■		■		5%
Red-legged Frog (USFWS 2005, 2002)							■	■		■		5%

As the saying goes, pictures are "worth a thousand words" and are particularly valuable when sharing project results with the public or other landowners. Use the Photo-Point Monitoring form to help standardize the process (Appendix A). It is important to locate photo-points so that they

capture a representative area of the field or a limiting factor at the site such as an eroding streambank. The photo-point location must allow for repeated unobstructed photos once trees become tall similar to Figure 1 and place points on the project map or site sketch. Detailed notes on the precise location and direction of photo points are written on the Photo-Point Monitoring form (Appendix B). The first photos are taken prior to installation of practices before grading is conducted, during installation (Figure 2) and post-project as explained by Gerstein and Kocher (2005). These are shared with landowners so they can be incorporated into ranch plans. For further information, refer to McDougald et al. (2003), Ward et al. (2003a), Herrick et al. (2005a), and Wildland Solutions (2008).

Collecting information regarding project design, layout and location on a Site Map (Figure 5) is important to organize and guide monitoring at the project site. Site maps facilitate communication between RCD partners for project planning, implementation and pre-project baseline quantitative effectiveness monitoring. Monitoring sub-sections within the site are delineated for collecting and managing quantitative effectiveness data. They are based on channel and streambank stability, existing vegetation, or conservation practices implemented such as bank stabilization and revegetation zones similar to Figure 5.

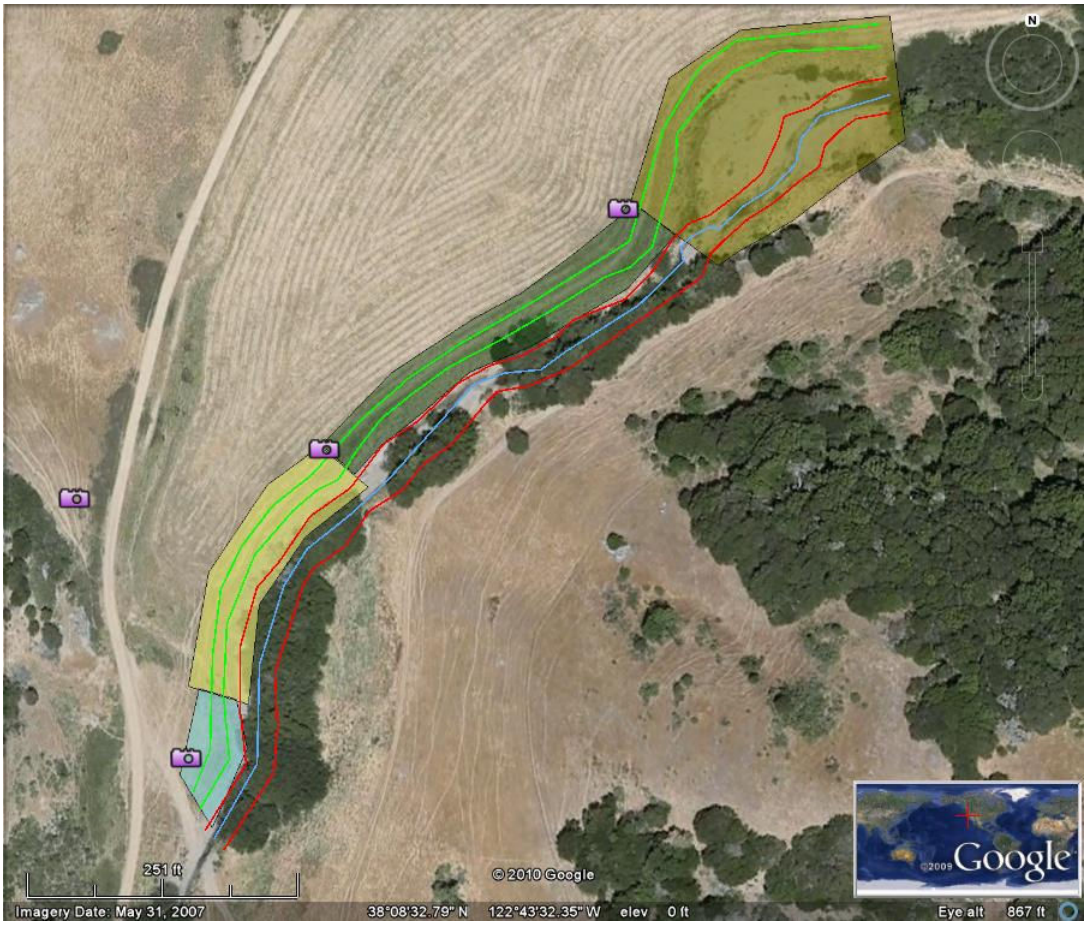


Figure 5: Example of a riparian revegetation project site with sub-sections, transects and photo-points overlayed on site map. The polygons delineate the four separate sections of the site monitored individually over time based on the planting design and site conditions. Quantitative monitoring includes Streambank Stability Line Intercept Transects (red lines), Aquatic Habitat Transect (blue line), and Riparian Line Intercept Transects (green lines). Photo-points are marked with camera icons.

The data from each sub-section is tracked individually over time for sediment load estimates, bank stability, vegetation and aquatic habitat changes. The boundaries between each subsection are marked in the field with T-posts or other permanent identifying feature depending on landowner preferences and the area of each section is measured in acres. The site map may be from various sources with appropriate detail for each conservation practice planned including Site Sketch form (Appendix A), GIS, Google, AutoDesk, or other mapping software. Large sites or complex projects may have both site maps and an AutoCAD as-built (Figure 6).

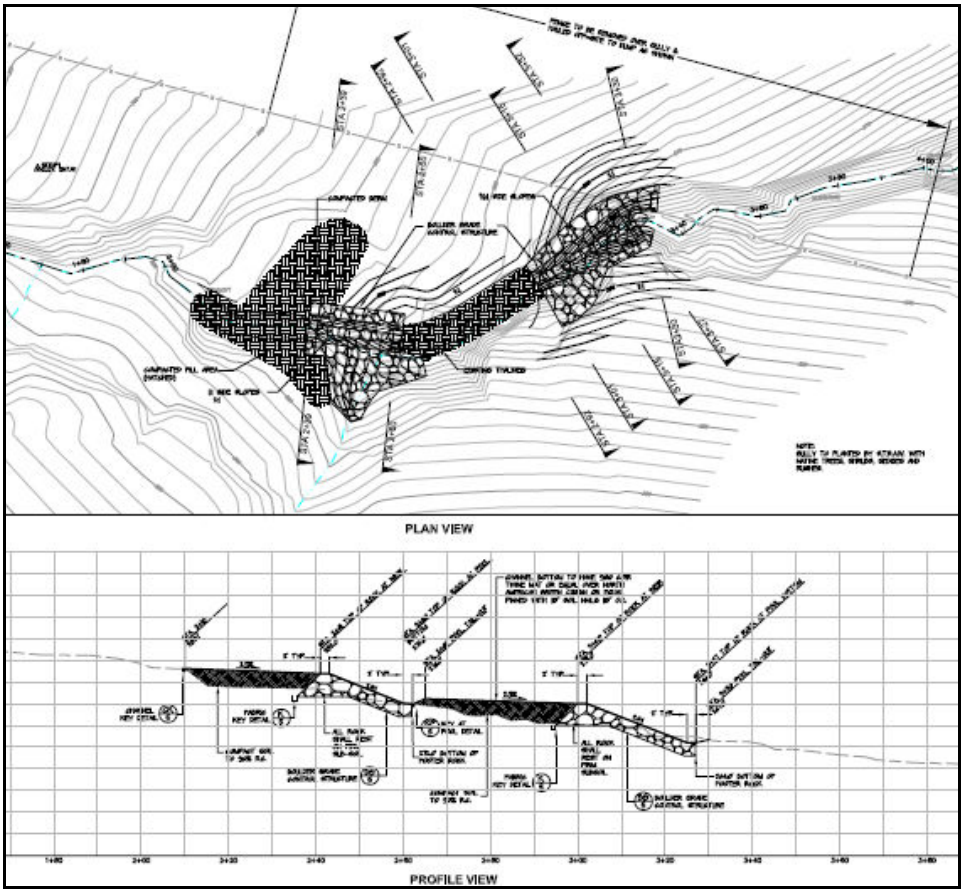


Figure 6: An example of a pre-project as-built for grade stabilization practice at the site in Figure 2 depicting two grade stabilization structures in a plan view (top) and profile view (bottom). Image courtesy of Prunuske Chatham, Inc.

Implementation Monitoring

Marin RCD's implementation monitoring includes the location, extent, concerns, and maintenance needs of each practice for every project site. Project success often depends on adaptively responding to unforeseen circumstances at the site. Similar to the construction monitoring process that provides quality control during installation, adapting and responding to maintenance needs is the primary purpose of Marin RCD's implementation monitoring. Landowner feedback and participation is critical to finding and solving potential problems Table 2 summarizes the attributes, targets and protocols for each implementation project objective. The timeline to complete these tasks does not include pre-project data and generally ends about three years after project completion so the results may be included in final project reports.

After the project is implemented, update or redo the site map or sketch with accurate locations or changes in extent of practices such as revegetation zones, fences, structures, water troughs, etc.

Repeat photo-points immediately after construction and be sure the location is accurate on the site map. Also, collect project statistics including the total distance of stream treated with conservation practices, distance fenced, size area of each section within the site, etc. The Revegetation Data form summarizes distance of stream planted, number of each species planted, distance of biotechnical repairs, area of invasive plants removed, and student/ volunteer participation (Appendix B). These steps set the foundation to conduct the more intensive project monitoring components because qualitative and quantitative effectiveness monitoring depends on the documentation of project location, as explained in Gerstein et al. (2005a) and Collins (2009).

Table 2: Implementation monitoring attributes (with target value) and protocols organized by project objective.

Project Objective	Completed Practices Location	Landowner Concern	Revegetation Survival
Measured Attribute (Target)	extent of each practice, as-built changes, delineate reveg. zones, # of each species planted/ area seeded, etc. (95%)	landowner satisfied (80%), problems fixed (90%)	survivorship (80%), establishment (40%)
Form/ Protocol	Site Map/ Sketch, Photo-points, Reveg. Data, Project Assessment Checklist	Landowner Questionnaire, Project Assessment Checklist, Maintenance/Event	Revegetation Survival

The Project Assessment Checklist (PAC) offers an important tool to systematically assess implementation, maintenance and landowner needs at the site following project installation (Appendix B). It is adapted from an existing Marin RCD checklist with questions to identify responsibility for adaptive management needs at the site and includes both implementation and effectiveness monitoring types. This qualitative assessment evaluates repair needs for fences, structures, water troughs, pipelines springs, crossings, roads, plantings, streambanks, livestock grazing, etc. during the critical three years after installation. As a result, RCD monitoring is designed to find potential problems and fix them before they undermine project success instead of documenting implementation mistakes.

The Landowner Questionnaire assesses landowner or land manager opinion regarding project success and how this perception may change over time (Appendix B). The intent is to assess landowner satisfaction, ranch viability/ productivity, landowner confusion during planning/ implementation, and unintended side effects from the conservation project in order to reduce potential miscommunication and future problems. The questionnaire is completed for most Marin RCD projects less than three years after installation for summary in grant reports, depending on landowner availability. The answers are quantified in a trend detection approach using a 1 – 5 rating system (Dillman 2000). The questionnaire is designed to guide a personal interview with each landowner in a systematic process.

Survival of planted trees, shrubs and herbaceous plugs is monitored to ensure adequate establishment and growth at revegetation projects. The Revegetation Survival form (Appendix B) was the result of a collaborative effort between the STRAW program and Prunuske Chatham, Inc. This protocol quantifies survival and establishment in a direct count census approach based on the vigor status (systemic stress vs. healthy new growth) and height (more or less than three feet tall) of each individual plant (Harris et al. 2005). Project sites are subdivided into revegetation zones based on conservation practices, left/right streambank, bioengineering structure or other project design component. This permits collection of survival data using the site sketch or other map. These revegetation zones, or subsections, allow for incorporation of these factors into data analysis, allowing greater accuracy of data collection and correlation with Line Intercept Transect data. At each site, browse pressure, causes of mortality (gopher, mowed, mis-planted, buried, erosion, livestock, irrigation, rodent, etc.) and weed populations are characterized. Invasive weed populations encountered will be reported to RCD staff and the landowner. Survival data is collected annually for three years and replanting is usually done if the survival rate is less than 80%.

The Maintenance & Event Monitoring form is designed to document actions taken to fix eroded and eroding soil, fill or sedimentation usually related to roads or stream crossings (Weaver et al. 2005, p. 79). This form provides a means to record the volume of soil that moved in cubic yards, the location, and when it occurred. Though often obvious at the time erosion occurred, add the eroded volume to Sediment Load Estimates for quantitative effectiveness monitoring instead of relying on personal memory. In addition to reducing sediment delivery in a watershed, it is often expected that conservation practices will reduce maintenance needs for landowners. Therefore, one important measure of project success is the frequency at which maintenance activities occur before and after restoration. Typical events monitored include frequency of culvert plugging and occurrence of drainage facility-related erosion. (Weaver et al. 2005)

For further information regarding implementation monitoring, refer to Collins (2009) for updated forms and protocols from the California Department of Fish and Game's (CDFG) Coastal Monitoring and Evaluation Program. CDFG collaborated with the University of California Berkeley Center for Forestry to provide protocols and guidance regarding Photo Description (Gerstein and Kocher 2005), Project Site Sketch, Site Access/ Location, Project Site Navigation, and (Gerstein et al. 2005) and the pertinent tools have been integrated with this plan where relevant to the RCD. Specific implementation monitoring protocols tailored to certain types of restoration projects (Kocher and Harris 2005) may be referred to in the future for evaluating certain RCD practices such as stream crossings, instream habitat, and fish passage from Collins (2009). Not all the implementation monitoring methods used by CDFG pertain to the RCD restoration program.

Effectiveness Monitoring

RCD effectiveness monitoring includes both qualitative and quantitative approaches to balance intensive measurement of specific attributes with a broad overview of each project over time. Thus, a subset (10-25%) of projects are evaluated using the quantitative protocols and the

attributes selected for monitoring depend on site objectives (Table 3) with realistic targets that indicate water quality (Lewis et al. 2011, 2010, Singer et al. 1982) and habitat improvements (Lennox et al. 2011, Gardali et al. 2006). Before revisiting project sites for field data collection, review the project objectives, site map, and previously collected data.

The objectives that benefit ranch/ farm viability (pasture productivity, livestock management, water use, etc.) are primarily assessed by completing the Landowner Questionnaire (Appendix B). It may be used in situations where there is a concern that the project may unintentionally reduce pasture productivity or complicate livestock management. The Questionnaire can be completed at the end of grant funding and potentially every five or ten years to monitor the long-term affects of projects over multiple decades. Landowner needs often change over time so the Questionnaire and Project Assessment Checklist offer RCD staff tools to document those changes, along with impacts to ranch productivity or management, such as broken fences and invasive weed populations.

Table 3: Effectiveness monitoring attributes (with target value) and protocols organized by project objective.

Project Objective	Benefit ranch viability/ productivity	Reduce/ prevent sediment delivery/ erosion	Reduce/ prevent pathogen or nutrient delivery	Improve/ preserve riparian habitat	Improve/ preserve aquatic habitat
Measured Attribute (Target)	landowner observations, electric/ vet./ water bill, RDM	Eff. ratings (80%), RDM (1000 lb/ac), eff. rating (80%), groundcover (90%), bank stability (75%)	RDM (1000 lb/ac), groundcover (90%)	Eff. rating (80%), Cover of native tree (60%) shrub (30%) inv. exotic weeds (<30%), & species #	shelter rating (80), shade (90%), LWD (2/100ft), max. pool depth (1m), bankfull W:D (<3:1)
Form/ Protocol	Landowner Questionnaire, Project Assessment Checklist, Sediment Load Estimates	Project Assessment Checklist, Sediment Load Estimates, Streambank Stability Line Intercept, Cross-sections	Project Assessment Checklist, Streambank/ Riparian Line Intercept	Project Assessment Checklist, Streambank/ Riparian Line Intercept	Project Assessment Checklist, Aquatic Habitat, Stream Shade, Tag Lines, Resurvey Site

The Project Assessment Checklist (PAC) offers a qualitative monitoring tool to rapidly assess natural resource conditions for rating practice effectiveness and project success (Appendix B). In addition, the PAC incorporates current science-based approaches to visually estimate *residual dry matter (RDM)* (Wildland Solutions 2008), *riparian vegetation* (Ward et al. 2003a, Ward et al. 2003b, USDA 1998), *stability* (Ward et al. 2003a, Ward et al. 2003b, USDA 1998), *invasive plants* (NPS 2010, Cal-IPC 2006, Rew et al. 2006), and *instream habitat* (Collins 2009, Flosi et al. 1998) including fish passage (NOAA 2001). The qualitative effectiveness ratings in the Checklist have been field tested by CDFG's Coastal Monitoring and Evaluation Program (Collins 2009, Harris et al. 2005a, Kocher and Harris 2005). The visual estimation of RDM requires calibration from local rangeland professionals with experience weighing biomass from the coastal prairie and annual rangelands of Marin County. For setting objectives or interpreting

RDM data, refer to Bartolome et al. (2006) and Guenther (2007). Invasive plant monitoring collaborates with the Bay Area Early Detection Rapid Response (EDRR) program and Marin-Sonoma Weed Management Area (WMA) to prioritize species for removal and control on private land given the succession of problem species over time (Figure 7, Lennox et al. 2010). The accompanying Project Assessment Checklist Guide provides definitions for the categorical effectiveness ratings and site condition assessments (Appendix B).

Figure 7: Milk thistle within the fenced area around a gully one year after grade stabilization/tree planting (left), and Himalaya blackberry under willow 30 years after control fencing along a stream (right).

The timeline to complete quantitative monitoring tasks begins before project installation and ideally includes three site visits for data collection (pre-project baseline, year 1, year 2 or 3) before final project reports are completed. However, at a minimum, two site visits are needed at a site receiving quantitative monitoring (one pre-project and one post-project) before project reports are completed. Quantitative monitoring will continue with site visits every 3-5 years for about 20 years or until the objectives are achieved, depending on landowner permission. Data is collected and organized based on the subsections zones delineated on the site map or sketch. The qualitative monitoring protocols are not completed as often – years 1 and 2 or 3, in general.

Reduction in fine sediment erosion and delivery is a common, high priority objective for Marin RCD conservation projects. Sediment Load Estimates (Appendix C) are used to quantify *streambank and gully erosion* by quantifying the volume of potential erosion at the project site based on Lewis et al. (2000, 2001). Similar methods were used by Weaver et al. (2005) and Klein (2003). The deliverable fine sediment saved by each project is the sum of each section within the site and calculated by subtracting the post-project value from the pre-project results. Unstable streambanks and channels are generally identified by the following morphological features (Overton et al. 1997, Rosgen 2001, Gerstein and Harris 2005):

1. breakdown if clumps of bank are broken away and banks are unvegetated,
2. slumping if banks have slipped down recently,
3. tension cracks or fracture if a crack is visible on the bank, or
4. vertical and eroding if the bank is mostly uncovered, in other words, less than 50 percent covered by perennial vegetation, roots, rocks of cobble size or larger, or logs of 0.1 meter in diameter or larger, and the bank angle is steeper than 80 degrees from the horizontal.

Streambanks with an angle >80 degrees from horizontal are generally considered unstable, 45-80 degrees may be at risk of instability and banks that are at an angle of less than 45 degrees (1:1) are stable. However, in some geologic settings of Marin County, vertical and unvegetated streambanks may be stable for decades and headcuts may be armored where impervious bedrock material is available (Figure 8). Undercut banks are considered stable unless tension fractures show on the ground surface at the back of the undercut (Weaver et al. 2005, Klein 2003).

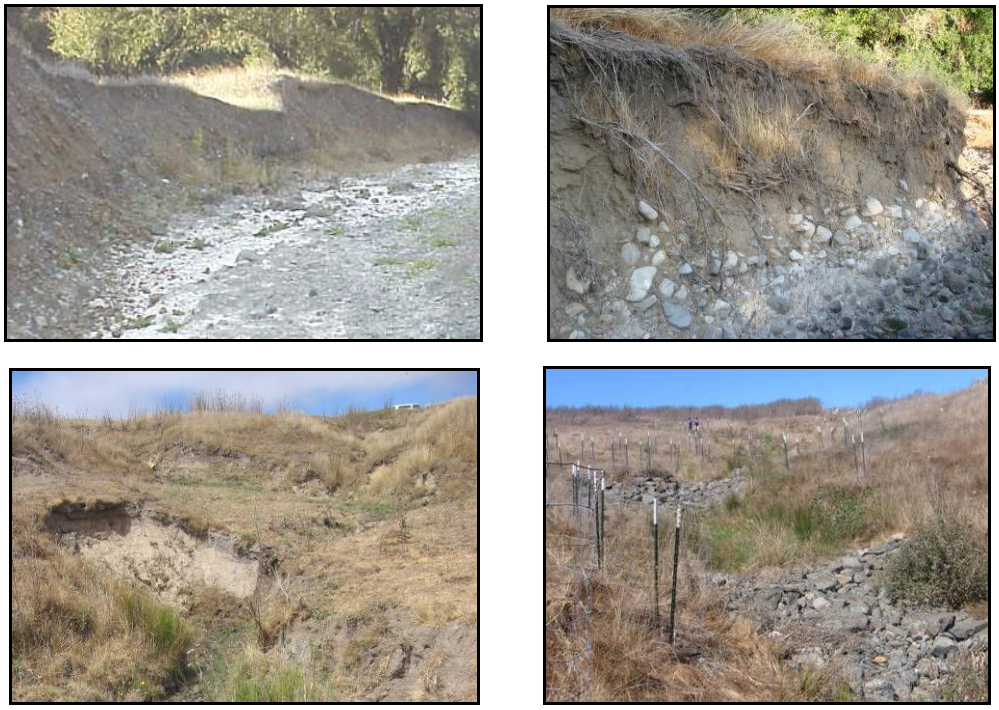


Figure 8: Typical streambank erosion (top left), a similarly barren but more stable streambank (top right), combined gully and bank erosion before project (bottom left), and after grade control structures and planting is completed (bottom right).

For estimating *sheet and rill erosion*, models have evolved since the 1940s (Spaeth et al. 2003). For grazed watersheds, the Rangeland Hydrology and Erosion Model (RHEM) is available on the internet at http://apps.tucson.ars.ag.gov/rhem/ (Wei et al. 2009) and the Sediment Load Estimates form provides a guide to field data collection (Appendix C). Though most sediment controlled is from streambank or gully erosion types, conservation projects that increase vegetation cover often reduce rates of sheet and rill erosion. The RHEM is used pre-project and about two or three years post-project for streambanks and gullies to estimate sediment yield and soil loss. Field data is collected with the Sediment Load Estimates form in Appendix C. It assumes no concentrated flow using slope lengths less than 50 meters and is based on canopy, basal and litter cover as well as slope, precipitation and soil texture factors. Internet based access to soil information is available from NRCS (http://websoilsurvey.nrcs.usda.gov/app/) and UC Davis (http://casoilresource.lawr.ucdavis.edu/drupal/node/902). RHEM does not quantify the filtering capacity of overland flow entering riparian buffers and this will be investigated further. Previous models were intended for prioritizing and selecting future projects, such as the Universal Soil Loss Equation (USLE), or based on row crop data, such as Revised USLE (RUSLE), and have been found to over and under estimate actual erosion rates on rangeland, respectively (Spaeth et al. 2003, Tiwari et al. 2000). For large-scale basin and watershed models, the Automated Geospatial Watershed Assessment (http://www.tucson.ars.ag.gov/agwa/) is available (Goodrich et al. 2006).

Quantitative effectiveness assessment of riparian habitat at streambank and gully erosion control projects use the Streambank Stability Line Intercept Transect (Appendix C) at the toe of the bank near bankfull, following Gerstein and Harris (2005). This protocol also collects ground cover and plant diversity data along each transect, with the cover of each species grouped in three height classes (0-3, 3-15, 15+ feet). Monitoring stability and riparian vegetation in one transect located at the most sensitive location along the stream (i.e. bankfull) offers an efficient tool to assess site change over time, similar to the "greenline" (Winward 2000, Gerstein and Harris 2005, Herrick et al. 2005b). This protocol is used for most riparian improvement practices, including control fencing of the riparian corridor, planting of woody species, and other practices intending to reduce erosion or increase the filtering potential of riparian areas (Pearce et al. 1998). Examples include modifying upland management, groundcover and stability improvement and providing alternative water sources for livestock, with or without riparian fencing (Prunuske et al. 1994, George et al. 2007).

Cross-section analysis occurs on a subset of quantitative monitoring sites where gully erosion and stream bed down-cutting may occur and jeopardize project success or sedimentation may cause erosion or localized flooding (Gerstein and Harris 2005, Harrelson et al. 1994). The Channel Dimensions form is in Appendix C (Gerstein and Harris 2005) or the Tag Lines form is used at gullies (Weaver et al. 2005, p. 40). Resurveying and mapping the entire site with post-project contour lines will be investigated further to estimate total eroded soil similar to displacement surveys described by Weaver et al. (2005).

Pathogen and nutrient fate and delivery complex to document at the watershed scale. However, numerous research studies have documented significant reductions in nutrient concentrations, pathogen indicators, and specific pathogenic organisms resulting from greater amounts of herbaceous vegetation (e.g. negative correlations) at the site and ranch scale. Thus, groundcover and residual dry matter (RDM) changes at the project site indicate reductions in pathogen and nutrient delivery. Recent studies in Marin County have found decreased pathogens in runoff as groundcover increased, including fecal coliform (Lewis et al. 2011, Lewis et al. 2010, Lennox et al. 2007), *Giardia* (Miller et al. 2007) and *Cryptosporidium* (Miller et al. 2008). Similarly, increasing RDM reduced *E. coli* in an intensive field study of vegetated buffers in the Sierra Nevada foothills (Tate et al. 2006) and reduced *C. parvum* in a controlled study (Tate et al. 2004). Concentrations of phosphorus and nitrogen, in runoff are reduced with more vegetation to uptake excess nutrients or filter through the soil until the build up of litter and decadent plant material may release nutrients (Dosskey et al 2007). Plus, restored floodplains have been documented to function as nitrate sinks (Sheibley et al. 2006) and the greater extent of riparian vegetation has correlated to less nutrients in runoff (Houlahan and Findlay 2004). Overall, pathogen and nutrient delivery to streams decreases and the filtering capacity of the stream increases as groundcover along the stream increases. Groundcover is assessed using the Streambank Stability and/or Riparian Line Intercept Transects with an adapted gap intercept approach to quantify the amount of bare ground along the transect over time (Herrick et al. 2005b.

Riparian habitat improvement objectives commonly involve increasing the abundance and diversity of native woody vegetation along streams at historically grazed project sites in Marin County. Harris et al. (2005) consolidated existing protocols into an efficient method to assess plant species cover over time since project installation at California riparian restoration sites using the Riparian Line Intercept Transect (Appendix C). This method is used for any practice intended to improve or protect riparian vegetation, such as exclusionary fencing and other indirect passive approaches, in addition to direct planting. The vegetation data collected is the same as the Streambank Stability Line Intercept Transect, with species cover organized by three height classes (0-3, 3-15, 15+ feet). Transects are placed where riparian vegetation is expected to change as a result of the project. A typical revegetation project site may have two Riparian Line Intercept Transects on each bank parallel to the stream with one below the top-of-bank (i.e. hydrologic floodplain) and one on the upper bank (i.e. topographic floodplain), in addition to the Streambank Stability Transect at bankfull (Figure 9). If the distance between transects is less than 20 feet, one Riparian Transect on the upper bank is sufficient. For projects without an objective to change or preserve upper bank vegetation, a Riparian Transect is not needed and the Streambank Stability Transect suffices. The Riparian Transect may also be placed in any location to survey and monitor isolated revegetation zones or species of interest such as native grass patches, sedges (*Carex spp.*), or western dog violet (*Viola adunca*) which is the larval host plant for Myrtle's Silverspot butterfly (NPS 2007). Herbaceous species cover and composition are assessed in the same transect as the woody species by adapting the gap intercept approach of Herrick et al. (2005b).

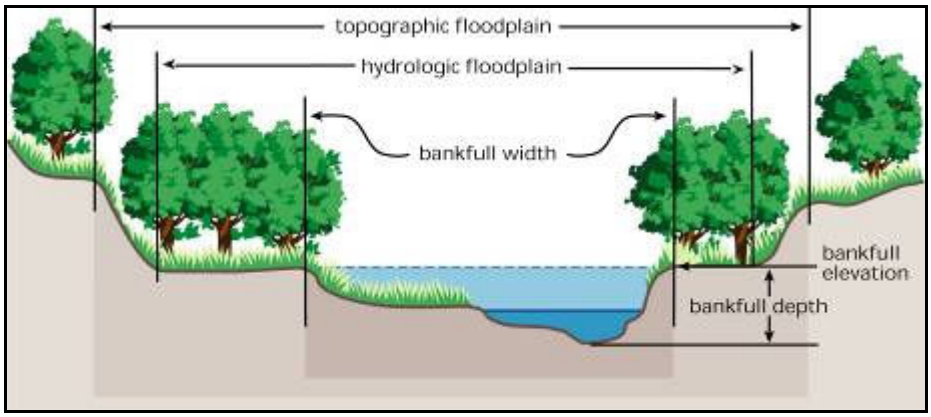


Figure 9: Example cross-section of a small stream showing bankfull channel and riparian floodplains (FISRWG 1998).

The extent of each transect depends on the revegetation zones and other subsections within each project site, using the site map or sketch as previously discussed. For each transect surveyed, the field data is collected and entered in the database according to the subsection zones to allow for correlation to survival, aquatic habitat, or other data. Plant species identification will follow the nomenclature in the NRCS PLANTS Database (USDA 2010b), while also utilizing local field guides and professionals. This method may be integrated with specific case studies or research projects to investigate the efficacy of weed removal techniques, planted versus colonized plants, or how individual trees grow over time (Harris et al. 2005).

Aquatic habitat improvements often target factors that may be limiting to specific populations in the area, such as water depth, cover, shade, etc. These objectives often apply to riparian control fencing practices, which indirectly affect aquatic habitat by allowing woody vegetation to colonize passively, in addition to practices directly improving the stream channel (Lennox et al. 2011). Similar to the previous discussed methodologies, aquatic habitat data are collected, recorded and analyzed by subsection zones based on the project site map. Cover values and shelter ratings (Flosi et al. 1998) are calculated using the Project Assessment Checklist's qualitative visual estimation (Appendix B) and the Aquatic Habitat form (Appendix C) quantitative transect of the channel thalweg, the deepest point in cross-section (Gerstein 2005). The Aquatic Habitat survey also assesses habitat type (Flosi et al. 1998), residual pool depth (Lisle 1987), stream width and woody debris (adapted from Gerstein, 2005). The Channel Dimensions form (Appendix C) is also used for longitudinal profiles to calibrate residual pool depth results from Aquatic Habitat surveys (Gerstein 2005, Harrelson et al. 1994).

Shade over the stream has been found to reduce stream temperature (Brown 1969). It is quantified at project sites as canopy density from the thalweg using a Densiometer, following Flosi et al. (1998) and the Stream Shade form adapted from Harris et al. (2005) (Appendix C). Shade is measured at a minimum of three locations, stratified within each subsection of a project site, but not less than 30-50 feet apart. Try to place these on riffles so the same location also receives an assessment of bankfull channel width-to-depth ratio using the Tag Lines form for small streams and gullies (Weaver et al. 2005, p. 40) or the Channel Dimensions form for rivers and permanent cross-sections (Appendix C, Gerstein 2005, Gerstein and Harris 2005). Tag Lines offer a time-efficient approach by confining measurements to the bankfull channel (Figure 10) and avoiding permanent markers (Herrick et al. 2005b, Rosgen 1996). Permanent cross-sections will calibrate the channel width-to-depth ratio results from Tag Line surveys. Three dimensional surveys to efficiently map the project site will be investigated for future applicability to project monitoring. For stream substrate monitoring, consult Gerstein et al. (2005b) and Hilton and Lisle (1993).

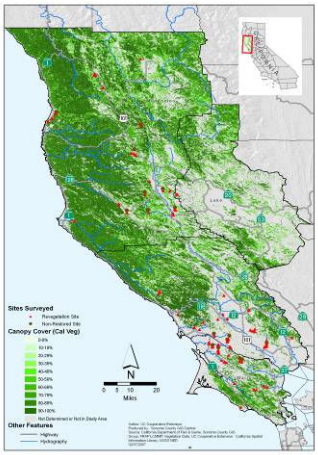
Figure 10: Tag Line measuring bankfull channel width and average depth for width:depth ratio.

Fish passage projects are expensive and often need detailed engineering specifications. Effectiveness monitoring uses both qualitative (Collins 2009, NMFS 2001) and quantitative (Stockard and Harris 2005) assessments. Fish passage project database and updated monitoring

protocols are available on the internet at the California Fish Passage Assessment Database (CDFG 2010).

Control and reference sites have been recommended for confirming that the quantified changes in site conditions resulted from the conservation project and associated practices implemented. However, Marin RCD's monitoring program focuses on systematically collecting pre-project baseline data. Appropriately comparable control sites have not been located for the sites monitored to date and monitoring them is an inefficient use of time compared to the usefulness of pre-project data. The magnitude of change for the site conditions monitored is expected to be statistically significant without comparisons to other sites (Lewis et al. 2009, Lennox et al. 2011). Thus, Marin RCD's monitoring program does not utilize control sites for effectiveness monitoring purposes. Reference sites may be considered for specific purposes in the future.

The focus of this plan is on site, or reach, scale effectiveness monitoring; however, remote sensing options such as Geographic Information Systems (GIS) with aerial photography (Wehren et al. 2002) and infrared imagery can be applied to effectiveness monitoring at the landscape scale (Roni 2005). Information collected from such a broad scale can be used to help interpret the variability of data collected at a finer scale similar to studies by Opperman et al. (2005) and Lennox (2007). For further information on specific methods, refer to Roni (2005) and Schilling et al. (2005). Essential to making this possible is documenting project location with GIS or other mapping software. The scale of maps produced will be large enough to not identify individual properties and the accompanying data will remain confidential among Marin RCD partners.



Residual dry matter (RDM) is assessed for refining grazing plans in pastures with streams, riparian pastures or for targeted grazing within "riparian exclosures". This may be done rapidly using the visual estimation protocol in the Project Assessment Checklist (Wildland Solutions 2008). A more accurate and quantitative alternative uses a "double sampling" approach to combine the accuracy of directly harvesting biomass with the speed of estimation (USDA 1997 Ch. 4, Herrick et al. 2005b). This double sampling transect may replace the Riparian Line Intercept Transect's assessment of groundcover and herbaceous species composition where grazing will be used for vegetation management. To document grazing schedules, efficient methods have been provided for range managers by California NRCS (USDA 2009) and for landowners by UCCE (Ward et al. 2003a). The NRCS Prescribed Grazing Support Tool assesses pasture specific management, the timing of livestock use and the constraints to productivity (water troughs, erosion, compaction, water quality) using Animal Unit Days (AUD) for planning rest periods and conservation alternatives.

For further information regarding qualitative effectiveness monitoring, refer to Collins (2009). The forms and instructions are currently being used to assess projects funded through the CDFG Fisheries Restoration Grant Program. Specific checklists that apply to RCD riparian enhancement projects include *Revegetation Treatments, Vegetation Control & Removal, Stream*

Crossings, Fish Passage, Instream Habitat & Bank Restoration and *Land Use Treatments & Exclusion Fencing*. These forms and instructions are available online (see References section).

Validation Monitoring

Habitat use of restored streams by terrestrial wildlife (birds, deer, rodents, etc.) or aquatic species (fish, amphibians, etc.) shows how, when, where and/or who is using the project site conditions previously documented by effectiveness monitoring. Table 4 outlines a few of the many validation monitoring opportunities. Field data collected is recorded by subsection zones within the project site as much as possible in order to correlate habitat conditions with the habitat use data.

Table 4: Validation monitoring attributes and protocols organized by project objective.

Project Objective	Increase/ preserve terrestrial wildlife abundance/ diversity	Increase/ preserve aquatic species abundance/ diversity	Improve/ preserve water quantity/ quality
Measured Attribute	species #, species of interest	Fish/amphibian/shrimp density, presence, species #	Spring/ summer stream temp
Protocol	Area search, Point-count survey	Snorkel/ visual surveys	Data loggers

Bird use of restored riparian habitat has been documented along the Sacramento River (Gardali et al. 2006) and in Marin County (Kreitinger and Gardali 2006). PRBO has also led the effort in validation monitoring of bird diversity and abundance at Marin RCD project sites using area search and point-count methodologies following the standardized protocols of Ralph et al. (1993, 1995). The timeline for terrestrial habitat use monitoring tasks is the same as the quantitative effectiveness monitoring components and begins before project implementation, especially if grading or other earthwork occurs at the site. Validation monitoring of other wildlife species has also been conducted at the Sacramento River in California (Golet et al. 2008) and will be further investigated for Marin RCD project sites using an appropriate research design (Morrison et al. 1994).

Fisheries monitoring is an intensive undertaking spanning over multiple years. Marin RCD strategically collaborates with its partners who undertake watershed scale monitoring programs to validate aquatic habitat use from its conservation projects. Basin-wide surveys beyond the project site (Dolloff et al. 1993) are combined with systematic site-scale data (Duffy 2005) to integrate landscape connectivity and metapopulations dynamics. Fish populations are monitored in the majority of Tomales Bay watersheds at previously restored stream sites by partnering agencies such as:

- ✓ Walker Creek – CDFG, Marin Municipal Water District (MMWD)
- ✓ Lagunitas Creek – MMWD, Salmon Protection and Watershed Network (SPAWN)
- ✓ Olema Creek and other coastal streams – Point Reyes National Seashore (PRNS)

Marin RCD has led limiting factors investigations, implements fish habitat improvement project where needed, seeks funding and assists with landowner access for partners to conduct monitoring. The 30 years of perfecting instream enhancement practices is an example of how Marin RCD monitoring documented unsuccessful projects (Kelley 1989) and collaborated to refine restoration techniques which are now showing the intended results of more fish (Ferguson 2005). Project partners monitor fish at stream sites previously restored by Marin RCD. Conservation projects have evolved to now focus resources on winter habitat for juvenile salmon because of Marin RCD's research (Stillwater Sciences 2008). As restored habitats connect and watershed functions improve, validation monitoring is in place to document overall improvement in native fish populations resulting from Marin RCD and partners' conservation practices (Andrew et al. 2010, MMWD 2010).

California freshwater shrimp (*Syncaris pacifica*) are monitored by the Nature Conservancy at a few stream restoration project sites where populations were known to already exist such as Stemple Creek. By increasing streamside vegetation and riparian forests, it is likely that the shrimp are more abundant (Fong and Vandenberg 1998). It is not known if conservation practices have increased the range into new habitat such as Walker or Chileno creeks (Serpa 2010) and this may be investigated further depending on landowner permission.

Amphibian validation monitoring for frogs (Bulger et al. 2006, USFWS 2005, USFWS 2002) and newts using a cross-sectional approach to assess aquatic habitat use at previously installed riparian and upland project sites is considered in conjunction with studies of native fish. The abundance of stock ponds across the landscape of west Marin County may have contributed to the continued presence of red-legged frogs in the county; however, the effect of conservation practices and watershed restoration on amphibian abundance has not been documented. Benthic macro-invertebrates (BMI) have been used as an indicator to monitor the quality of stream habitat and as an index for long-term water quality (Barbour et al. 1999). The data analysis for BMI's and other aquatic fauna requires dedicated staff resources and a financial commitment. Plus, controlling for the numerous environmental factors affecting populations, such as stream substrate, requires a rigorous research design that incorporates a water quality monitoring component.

Water quality and quantity monitoring is conducted at site, ranch, and watershed scales by Marin RCD and its partners. Objectives are wide ranging and include conservation practices related to water development, springs, troughs, tanks, irrigation, ponds, regulations, and increasing stream flow available. Stream temperature monitoring (Tate et al. 2005a, Tate et al. 2005b, SWRCB 2001, MacDonald et al. 1991) or other water quality assessments concurrently quantify stream flow (CARCD 2001, Tate 1995a, Tate 1995b). Projects that increase canopy cover and stream shade reduce solar radiation and most likely stream temperature. Confirming this occurred as a result of the project is an intensive undertaking that requires financial resources, staff time, particular skills and equipment over multiple years of monitoring. Plus, the factors that drive stream temperature and other water quality parameters often operate at a scale that is larger than the project site. Various upstream conditions may hinder the ability of a monitoring program to

detect a difference in water quality over time or above and below a particular project site. Thus, validation monitoring of stream temperature, turbidity, pathogens, and/ or flow at riparian restoration project sites is assessed in a multidisciplinary approach with partnering organizations. The Automated Geospatial Watershed Assessment (AGWA) software previously discussed may be an applicable modeling tool for assessing conservation's ability to improve water quality in Tomales Bay watersheds and this will be investigated further.

As riparian buffer connect and watershed functions improve, validation monitoring is being conducted to document improvement in water quality resulting from Marin RCD's conservation practices. Currently, Marin RCD strategically collaborates with its partners to validate water quality improvements at a watershed scale from its conservation projects such as:

- ✓ Walker Creek – Tomales Bay Watershed Council (TBWC), MMWD, RWQCB
- ✓ Lagunitas/ Olema Creeks – TBWC, MMWD, RWQCB, PRNS
- ✓ Tomales Bay – TBWC, RWQCB, CDFG, Department of Health Services (DHS)

Given the difficulty of documenting changes in validation monitoring parameters resulting from conservation projects, study designs incorporate some type of control site or measure of annual variation for the species observed. If an increase in a desired population is measured at the project site, how do we know it was caused by the project and not the result of annual, climatic or ocean conditions? One approach utilized by PRBO incorporates results from Audubon's Christmas Bird Count to ascertain if the population changed on a large scale independent of the project site conditions (Gardali et al. 2006). For aquatic species and water quality studies, a nearby control watershed or subwatershed is utilized.

Monitoring Tasks, Timing & Partner Roles

When to collect monitoring data is standardized in order to respond to needs at the project site and compare results over time such as pooling the data from numerous project sites for periodic programmatic evaluations. As mentioned, implementation monitoring occurs post-project and generally within three years after project implementation to summarize results for grant reports. Late summer and early fall are ideal monitoring seasons to evaluate groundcover as an indicator for water quality and fix potential problems before the next winter begins. The Project Assessment Checklist (PAC) and Landowner Questionnaire may be repeated to check on particular project sites if the project effectiveness rating was low (i.e. poor or fail) for any reason during the initial evaluation and changes were made to fix problems at the site.

In contrast, pre-project baseline data for quantified effectiveness monitoring and terrestrial habitat use is collected before the project begins or immediately following the completion of a practice, such as within a few weeks following the construction of a riparian fence (Table 2 & 5). This demands coordination during project planning and installation to avoid conflicts with construction activities and collect field data when the plants are identifiable and intermittent streams are flowing. Vegetation and bank stability data is collected in late summer or early fall while aquatic habitat surveys are conducted in early summer when streams are still flowing.

The monitoring tasks are designed to be completed by the appropriate responsible partnering organization data collection roles (Table 5). The coordination of partners to monitor project sites is ultimately the responsibility of Marin RCD. Sharing the workload among partners based upon their expertise, interest and availability has been crucial to Marin RCD's success. Organization and coordination among partners is important to maintain an efficient monitoring program. This is especially critical for the site map and photo-point monitoring so these tasks are not accidentally repeated and deadlines are met on time. Data management is a shared task among partners to consolidate results for reporting requirements. Marin RCD is responsible for reports to both landowners and funders. The raw data from monitoring will be pooled together for analysis to conduct periodic programmatic reviews and is the shared responsibility of Marin RCD and its partners.

Table 5: Monitoring tasks listed based on the monitoring form name (in Appendices or References), organized by the timeline and who is responsible for conducting each task. The percent of relevant projects to be monitored with each form is included.

Task (monitoring form)	Timeline	Data Collection Responsibility	% of Projects
Monitoring Plan Checklist	Pre-project	Project Manager	90-100%
Objectives/ Targets		Project Planner, Manager	90-100%
Map/ Site Sketch	Post-project completed < 3 years and for grants reports	Project Planner, Manager	90-100%
Revegetation Data		Consultant, Contractor, Manager	90-100%
Project Assessment Checklist		Project Manager, Consultant	90-100%
Landowner Questionnaire		Project Manager	90-100%
Revegetation Survival		Consultant, Contractor, Manager	90-100%
Photo-points	Pre-project, post-project, for reports, & repeated over time as funding allows	Project Manager, Planner, Consultant	90-100%
Sediment Load Estimates		Project Manager, Planner, Consultant	90-100%
Streambank Stability Line Intercept Transect		Consultant, Contractor	10-25%
Riparian Line Intercept Transect		Consultant, Contractor	10-25%
Aquatic Habitat		Consultant, Contractor	10-25%
Stream Shade		Consultant, Contractor	10-25%
Tag Lines		Consultant, Contractor	10-25%
Bird Surveys		Consultant (PRBO)	10-25%

The duration of effectiveness monitoring depends upon the amount of time required to reasonably ascertain whether project objectives have been met. In other words, the monitoring timeline depends on when target values are expected to be achieved as a result of the project and should reflect the time necessary for identified attributes to change. For example, streambank stability may be expected to improve within three years after project installation (Figure 11), while native tree canopy may take 10 years and residual pool depth may take multiple decades to manifest (Lennox et al. 2011). Therefore, subsequent visits to resurvey projects are repeated between one and five years or following large floods to document trends and changes in trajectory (Reeve et al. 2006, Lewis et al. 2009).

One of the primary problems encountered when monitoring revegetation survival at riparian planting projects over time is how to find the planted trees and shrubs among naturally colonizing vegetation (Harris et al. 2005b, Lewis et al. 2009). Conditions become particularly obscured along the edge of channels where alder (*Alnus spp.*), willow (*Salix spp.*) and cottonwood (*Populus spp.*) are planted in high densities with no protective hardware or marking. These trees may be washed out, buried by flood deposits, produce numerous sprouts, or natural colonization may occur among the planted individuals. This is particularly true for shrub willow species that propagate vegetatively, such as arroyo and narrow-leaved willow (*Salix lasiolepis* and *S. exigua*). Interpreting the origin of low sprouting regrowth often becomes impractical 10 to 20 years after project implementation. Therefore, cover is measured using the Line Intercept Transects for long-term effectiveness monitoring to systematically compare results over multiple decades. Establishment of planted trees and shrubs may be assessed up to 10 years post-project using the Revegetation Survival Form but this will depend on funding availability.

Figure 11: Photo-point sequence at a streambank stabilization project site pre-project (left) and during construction with installation of willow wattles following grading (right).

Certain aquatic habitat attributes have been shown to improve 20 to 30 years following riparian revegetation (Opperman and Merenlender 2004, Lennox et al. 2011). Documenting the habitat available to aquatic species is a lot easier than intensively validating habitat use by fish or amphibians, so more project sites can be evaluated in a relative and consistent manner over time. The interaction of woody vegetation and watershed hydrology during flood events may alter stream channel morphology and habitat complexity at certain sites. As trees grow, stream shade can rapidly increase while woody debris recruitment may be slower, and changes to the stream channel are the slowest. Monitoring these attributes should take this into consideration, being careful to select revegetation sites where these potential changes may occur and these objectives were clearly identified with the landowner during project implementation.

As previously discussed, effectiveness monitoring for 20 years or more is ideal in order to document when objectives are met, successional changes in vegetation (Lennox 2007), indirect improvements in aquatic habitat as a result of tree establishment, and unintended changes such as weeds (Lennox et al. 2011). However, this is longer than funding for projects will allow because most restoration contracts last about three years and may not fund monitoring. One notable exception is the Booneville Environmental Foundation, which has watershed restoration grants available for ten year funding cycles which include and require on well developed monitoring programs (Reeve et al. 2006). The RZMP enables Marin RCD to now compete for such opportunities.

Site conditions two to five years post implementation offer reasonable indicators of whether the conservation practices installed are likely to have the desired effects even if the duration of monitoring is insufficient to ascertain a direct response and thorough achievement of project objectives. The PAC provides a systematic tool for this important need. Environmental stresses, project maintenance, site management and seasonal factors are considered when planning and interpreting monitoring data because of their potential to influence results. For example, fences are a common tool and the success of numerous other practices depends on their integrity such as revegetation and channel stabilization. If a PAC survey finds an access point through a fence, the database would have a low effectiveness rating for the fence practice at the site for the monitoring date that may or may not slow the attainment of other objectives. Plus, the landowner or manager is contacted to discuss options for remedial action and future PAC surveys should observe higher effectiveness ratings. Other practices such as fish habitat, streambank protection, sediment traps, filter strips, and floodplain plantings are assessed after high flow events to determine site stability following extreme physical conditions and to plan repairs if problems are encountered.

Data Management & Reporting

Similar to collecting field data, managing data with foresight of the end products will provide an efficient process for reporting and collaborating among partners. Three types of reporting are conducted for Marin RCD conservation projects:

1. Landowner reports offer important information to maintain project success and respond to problems at the site while providing project details for incorporation into the landowner's ranch plan. Lessons learned from each project site are used to improve future practices implemented.
2. Grant reports to funders summarize monitoring results from sites appropriate to each funding source and deadlines need to be accommodated within one to three years.
3. Programmatic reviews of Marin RCD's restoration program include five-year PCP reviews (MRCD 2009) and compilations all of monitoring data available at the time. These further help to understand the long-term outcomes of conservation practices and offer recommendations for how to improve restoration efforts.

Privacy

As discussed, the participation of landowners is critical to watershed restoration in privately owned landscapes. A common limiting factor to landowner involvement in government conservation programs and grants are issues regarding data management and reporting information back to regulatory agencies. Marin RCD staff, partners and board of directors give this issue close attention in order to communicate clearly with interested landowners about what is considered public information.

Landowner Reports

The first phase of landowner reporting is informal and involves communicating maintenance needs encountered during monitoring visits back to the landowner or land manager in a timely manner so corrective action may be taken as soon as possible from year one to two.

The second phase includes formal summaries of monitoring results similar to the information included in the reports to funders. This allows for feedback and internal review of the effectiveness ratings from the Project Assessment Checklist. Fundamental attributes quantified

(e.g. streambank stability, volume erodible sediment saved, native tree cover, stream shade, etc.) related to the project objectives, comparing pre-project and post project conditions, may also be included. Landowners with grazing operations can add these reports to their ranch water quality plan.

Reports to Funders

Grant reports focus on documenting implementation and qualitative effectiveness monitoring results for the appropriate project sites funded. The project effectiveness ratings and photographs offer insight regarding how, when and what was done with the funding regarding preliminary project success. The landowner survey and quantitative effectiveness results may also be included if appropriate.

Programmatic Review

A programmatic review of the RCD's conservation projects is an opportunity to document broad accomplishments across multiple grant projects and evaluate project success to enhance riparian resources every five to ten years. Examples of such review include those completed for Mendocino County RCD's bioengineering projects (Wehren et al. 2002) and NRCS's bibliography reviews (USDA 2008a, b), as well as for specific regions such as the Russian River Watershed (Christian-Smith and Merenlender 2010), California (Kondolf et al. 2007) and across the United States (Bernhardt et al. 2007).

The Marin RCD programmatic review systematically documents conservation achievements and lessons which may be used in future grant applications. They summarize project number and practices within each watershed, project effectiveness, landowner satisfaction, plant survival and establishment, long-term project outcomes with effectiveness monitoring results and any habitat use documented. Landowner information and privacy continues to be preserved unless specific permission is given to the RCD to highlight certain projects as case studies. Geographic Information System (GIS) or other mapping software will be utilized to document what was done where at a broad scale so the specific location on any one ranch is not revealed. Basically, all monitoring data will be utilized and the RZMP will be reevaluated in the programmatic review.

A combination of practical and theoretical topics may be assessed in the programmatic review. Important questions to be answered include which project objectives were accomplished and how many landowner goals were satisfied? Also, were target values achieved in the expected amount of time following project implementation? Which plants established and which did not survive where? Do the species planted relate to species present? Does the number of plant species, total cover of all species or landscape position affect bird abundance at restored stream sites?

Monitoring Resources Required

Technical expertise and field experience needed to complete surveys is minimal for some attributes and high for others such as validation monitoring. All monitoring methods require detailed notes regarding transect location so someone else could repeat the survey in the future or if the site becomes overgrown by woody vegetation or fences are removed. Implementation monitoring requires

organizational skills and an understanding of NRCS conservation practices. Plant identification skills and a familiarity with the project site are necessary to conduct revegetation survival surveys.

The resources required to conduct effectiveness monitoring depend on the specific protocol used. The qualitative visual monitoring using the Project Assessment Checklist can be picked up after minimal training with RCD partners or local rangeland managers to learn terminology, estimate RDM and identify common invasive weeds. Quantitative monitoring requires experience identifying plants and interpreting stream geomorphology. Equipment needs include:

- ✓ Clipboard, field sheets and sharp pencils
- ✓ Camera
- ✓ 100+ foot tape measuring in tenths of a foot (1.25') instead of inches (1'3")
- ✓ GPS unit
- ✓ Clinometer
- ✓ Spray bottle
- ✓ Shovel
- ✓ Site map and topographic map
- ✓ Stadia rod (also tenths of a foot)
- ✓ Flagging with felt pens
- ✓ T-posts or other permanent markers

Transect surveys require an additional 300 foot tape measure, Densiometer (Flosi et al. 1998), hip chain with extra string, bubble level with a wind-out role of string (for Tag Lines), transit, stakes, and hammer. The data entry and analysis of transect data takes considerably more time to complete.

The validation monitoring resources to document habitat use or estimate populations generally require species identification skills as well as monitoring program design expertise. The aquatic species also require special agency permits for electrofishing and handling, so dive surveys using snorkel observations are a potential efficient long-term monitoring technique. Dive surveys require two staff highly skilled in the method and minimal equipment (dry or wet suits, underwater flashlights, small write in the rain notebook, rubber gloves). In contrast, electrofishing requires three to five staff and more permits and gear (electrofishers, dip nets, block nets, rubber gloves, five gallon buckets, thermometer, specific conductance meter, chest waders, anesthetic, measuring board, portable electronic balance). Marin RCD is thankful of its partners and relies on them to deliver the details of this RZMP over the next ten years.

The field testing phase of the RZMP streamlined the field work and focused the reporting components. The budget needs depend on the staff time to do each survey, which improves over time. The references for each protocol will be reviewed annually prior to summer data collection. Though the RZMP protocols are compiled from commonly used methods by natural resource professionals, the monitoring data collected is evaluated for accuracy and calibration needs. Data analysis will be done specific to the three reporting phases and statistical software will be necessary for programmatic reviews.

SUMMARY

Marin RCD staff and partners have the skill and experience to accomplish the monitoring goals detailed in this plan. The protocols included offer the ability to systematically document the performance of commonly used practices and should be applicable to other RCDs in California. Since the primary focus of Marin RCD is to provide landowners quality conservation projects, monitoring tasks and coordination have been woven into the project planning and maintenance activities so as to not add unnecessary tasks for the people designing and installing projects. However, additional economic resources will be necessary to continue the data collection, management and analysis tasks outlined in this plan. Plus, it is critical during this process to maintain landowner privacy and be clear how project site information will be shared with funding agencies.

The information obtained through monitoring provides useful feedback to future project participants and grantors as restoration professionals continue to decipher the reasons behind project successes and failures and apply those lessons to their practice. When project outcomes and the resulting conservation lessons are shared with the community at large, overall knowledge increases to form a common understanding while guiding the sciences of agricultural sustainability and ecological restoration. Even "unsuccessful" projects that fail to meet their objectives or target values can contribute useful information to this process. As stated by Palmer et al. (2005), "Assessment is a critical component of all restoration projects but achieving stated goals is not a prerequisite to a valuable project. Indeed, well-documented projects that fall short of initial objectives may contribute more to the future health of our waterways than projects that fulfill predictions."

The structure of this RZMP is based on the development of realistic, measurable project objectives and collecting pre-project baseline data to determine how the project affected site conditions. The protocols used in the field to assess project outcomes for decades into the future depend on the clarity of objectives documented before project installation. In addition to documenting the intended objectives, consistent and systematic monitoring also allows for inadvertent outcomes to be documented and responded to, such as the encroachment by exotic species over time. Though the project may officially end after three years when the grant terminates, this plan sets up a long-term process to manage project sites and respond to landowners' needs over multiple decades while learning more about the ability for riparian vegetation to improve watersheds and sustain ecosystem services in Marin County for generations to come.

REFERENCES

Andrew, G., E. Ettlinger, E. Childress, M. Piovarcsik, D. Morrell, and A. Wolf. 2010. Lagunitas Creek Review and Evaluation Report 1997 – 2009, Draft. Marin Municipal Water District, Corte Madera CA. 246 p. http://www.marinwater.org/controller?action=menuclick&id=442

Bartolome, James W. William E. Frost, Neil K. McDougald, Michael Connor. 2006. California Guidelines for Residual Dry Matter (RDM) Management on Coastal and Foothill Annual Rangelands. Division of Agriculture and Natural Resources Publication 8092. http://anrcatalog.ucdavis.edu./pdf/8092.pdf

Bernhardt, E.S., M.A. Palmer, J.D. Allan, G. Alexander, K. Barnas, S. Brooks, J. Carr, S. Clayton, C. Dahm, J. Follstad-Shah, D. Galat, S. Gloss, P. Goodwin, D. Hart, B. Hassett, R. Jenkinson, S. Katz, G.M. Kondolf, P.S. Lake, R. Lave, J.L. Meyer, T.K. O'Donnell, L. Pagano, B. Powell, and E. Sudduth. 2005. Synthesizing U.S. River Restoration Efforts. *Science* 308: 5722. p. 636-637.

Bernhardt, E.S., E.B Sudduth, M.A. Palmer, J.D. Allan, J.L. Meyer, G. Alexander, J. Follstad-Shah, B. Hassett, R. Jenkinson, R. Lave, J. Rumps, and L. Pagano. 2007. Restoring rivers one reach at a time: results from a survey of U.S. river restoration practitioners. *Restoration Ecology* 15(3): 482-493.

Brown, G.W. 1969. Predicting temperatures of small streams. *Water Resources Research* 5:68-75.

Bulger, J.B., N.J.Scott, and R.B. Seymour. 2003. Terrestrial activity and conservation of adult California red-legged frogs *Rana draytonii* in coastal forests and grasslands. *Biological Conservation* 110:85-95.

Cal-IPC. 2006. California Invasive Plant Inventory. Cal-IPC Publication 2006-02. California Invasive Plant Council: Berkeley, CA. http://www.cal-ipc.org/ip/inventory/weedlist.php

CDFG (Ca. Department of Fish and Game). 2010. California Fish Passage Assessment Database Project (PAD). CalFish: A Ca. Cooperative Anadromous Fish and Habitat Data Program. http://www.calfish.org/tabid/83/Default.aspx

Christian-Smith, Juliet, and A. M. Merenlender. 2010. The Disconnect Between Restoration Goals and Practices: a Case Study of Watershed Restoration in the Russian River Basin, California. *Restoration Ecology* **18**, 95–102.

Collins, B. 2009. Coastal Restoration Monitoring and Evaulation Program (CRMEP) Qualitative Monitoring Forms. California Department of Fish and Game, Fort Bragg, California. http://ftp.dfg.ca.gov/Appupdates/CHRPD/Qualitative_Monitoring_Forms/

Dahm, C.N., Cummins, K.W., Valett, H.M. and Coleman, R.L. 1995. An ecosystem view of the restoration of the Kissimmee River. *Restoration Ecology* 3**:** 225–238.

Dean, C. 2008. Follow The Silt. *New York Times*. November 24, 2008. http://www.nytimes.com/2008/06/24/science/24stream.html?_r=2

Dillman, D.A. 2000. *Mail and Internet Surveys: The Tailored Design Method.* New York: J Wiley. 464 p.

Dolloff, C.A., D.G. Hankin, and G.H. Reeves. 1993. *Basinwide estimation of habitat and fish populations in streams*. General Technical Report SE-83. Ashville, North Carolina: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station. 25 p. http://www.srs.fs.usda.gov/pubs/viewpub.jsp?index=1764

Dosskey, M.G., K.D. Hoagland, and J.R. Brandle. 2007. Change in filter strip performance over ten years. *Journal of Soil and Water Conservation* 62: 21-23.

Duffy, W. 2005. *Protocols for Monitoring the Response of Anadromous Salmon and Steelhead to Watershed Restoration in California.* Draft prepared for the California Department of Fish and Game Salmon and Steelhead Trout Restoration Account. California Cooperative Fish Research Unit, Humboldt State University. Arcata, California. 84 p. http://www.dfg.ca.gov/fish/Resources/Reports/index.asp

FISRWG. 1998. Stream Corridor Restoration: Principles, Processes, and Practices. By the Federal Interagency Stream Restoration Working Group (FISRWG)(15 Federal agencies of the US gov't). GPO Item No. 0120-A; SuDocs No. A 57.6/2:EN 3/PT.653. ISBN-0-934213-59-3. http://www.nrcs.usda.gov/technical/stream_restoration/

Flosi, G., S. Downie, J. Hopelain, M. Bird, R. Coey and B. Collins. 1998. *California Salmonid Stream Habitat Restoration Manual, Third Edition*. Sacramento, California, California Department of Fish and Game, Inland Fisheries Division. 497 p. http://www.dfg.ca.gov/fish/Resources/HabitatManual.asp

Ferguson, L.C. 2005. Quantification of the Role of Large Woody Debris for Coho Habitat Restoration. Masters Thesis, University of California Davis. Davis, Ca. 60 p.

Fong, D., and M. Vandenberg. 1998. Recovery Plan for the California Freshwater Shrimp (*Syncaris pacifica*). U.S. Fish and Wildlife Service, Region I. Portland, Oregon. http://www.fws.gov/ecos/ajax/docs/recovery_plan/980731a.pdf

Freeze, R.A. and J.A. Cherry. 1979. Groundwater. Prentice Hall, Englewood cliffs, New Jersey.

Gardali, T., A. L. Holmes, S. L. Small, N. Nur, G. R. Geupel and G. H. Gulet. 2006. Abundance patterns of landbirds in restored and remnant riparian forests on the Sacramento River, California, U.S.A. *Restoration Ecology* 14: 3.

George, M., D. Bailey, M. Borman, D. Ganskopp, G. Surber, and N. Harris. 2007. Factors that Influence Livestock Distribution. U.C. Division of Agriculture and Natural Resource Publication 8217. Davis, Ca. http://californiarangeland.ucdavis.edu/Publications%20pdf/8217.pdf

Gerstein, J.M. 2005. *Monitoring the Effectiveness of Instream Habitat Restoration*. University of California, Center for Forestry, Berkeley, California. 45 p. http://forestry.berkeley.edu/comp_proj/DFG/Monitoring%20the%20Effectiveness%20of%20Instream%20Habitat%20Restoration.pdf

Gerstein, J.M. and R.R. Harris. 2005. *Protocol for Monitoring the Effectiveness of Bank Stabilization Restoration.* University of California, Center for Forestry, Berkeley, CA. 24 p. http://forestry.berkeley.edu/comp_proj/DFG/Monitoring%20the%20Effectiveness%20of%20Bank%20Stabilization%20Restorati.pdf

Gerstein, J.M. and S.D. Kocher. 2005. *Photographic Monitoring of Salmonid Habitat Restoration Projects*. University of California, Center for Forestry, Berkeley, CA. 21 p. http://forestry.berkeley.edu/comp_proj/DFG/Photographic%20Monitoring%20of%20Salmonid%20Habitat%20March%202005.pdf

Gerstein, J.M., S.D. Kocher and W. Stockard. 2005a. *Documenting Salmonid Habitat Restoration Project Locations*. University of California, Center for Forestry, Berkeley, CA. 22 p. http://forestry.berkeley.edu/comp_proj/DFG/Documenting%20Salmonid%20Habitat%20Restoration%20March%202005.pdf

Gerstein, J.M., W. Stockard and R.R. Harris. 2005b. *Monitoring the Effectiveness of Instream Substrate Restoration*. University of California, Center for Forestry, Berkeley, CA. 53 p. http://forestry.berkeley.edu/comp_proj/DFG/Monitoring%20the%20Effectiveness%20of%20Instream%20Substrate%20Restorati.pdf

Golet, G.H., T. Gardali, C.A. Howell, J. Hunt, R.A. Luster, W. Rainey, M.D. Roberts, J. Silveira, H. Swagerty, and N. Williams. 2008. Wildlife Response to Riparian Restoration on the Sacramento River. *San Francisco Estuary and Watershed Science* 6:1-26. http://www.sacramentoriver.org/SRCAF/publications/Golet%20Compresed-2008.pdf

Goodrich, D.C., S. Scott, M. Hernandez, I.S. Burns, L. Levick, A. Cate, W. Kepner, D. Semmens, S. Miller, P. Guertin, 2006. Automated Geospatial Watershed Assessment (AGWA): A GIS-Based Hydrologic Modeling Tool for Watershed Management and Landscape Assessment. In: Proceedings, Third Federal Interagency Hydrologic Modeling Conference, Reno, NV, April 2-6, 2006. http://www.tucson.ars.ag.gov/agwa/docs/pubs/1D_Goodrich.pdf

Griggs, F. Thomas and Golet, Gregory H. 2002. Riparian valley oak (*Quercus lobata*) forest restoration on the middle Sacramento River, California In: Standiford, Richard B., et al, tech. editor. Proceedings of the Fifth Symposium on Oak Woodlands: Oaks in California's Challenging Landscape. Gen. Tech. Rep. PSW-GTR-184, Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture: 543-550. http://www.fs.fed.us/psw/publications/documents/psw_gtr184/046_Griggs&Golet.pdf

Guenther, K. 2007. Wildland Solutions RDM Monitoring Procedure. 10 p. http://www.wildlandsolutions.com/WS_RDM_monitoring.pdf

Harrelson, Cheryl C., C.L. Rawlins, John P. Potyondy. 1994. *Stream channel reference sites: an illustrated guide to field technique*. Gen. Tech. Rep. RM-245. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 61 p. http://www.fs.fed.us/rm/pubs_rm/rm_gtr245.pdf

Harris, R.R., C.M. Olson, S.D. Kocher, J.M. Gerstein, W. Stockard and W.E. Weaver. 2005a. *Procedures for Monitoring the Implementation and Effectiveness of Fisheries Habitat Restoration Projects*. Center for Forestry, University of California, Berkeley. 24 p. http://forestry.berkeley.edu/comp_proj/DFG/Monitoring%20the%20Implementation%20and%20Effectiveness%20of%20Fisheries.pdf

Harris, R.R., S.D. Kocher, J.M. Gerstein and C. Olson. 2005b. *Monitoring the Effectiveness of Riparian Vegetation Restoration*. University of California, Center for Forestry, Berkeley, CA. 33 p. http://forestry.berkeley.edu/comp_proj/DFG/Monitoring%20the%20Effectiveness%20of%20Riparian%20Vegetation%20Restorat.pdf

Herrick, Jeffrey E., Justin W. Van Zee, Kris M. Havstad, Laura M. Burkett and Walter G. Whitford. 2005. *Monitoring Manual for Grassland, Shrubland and Savannah Ecosystems: Volume I – Quick Start*. USDA-ARS Jornada Experimental Range, Las Cruces, NM. 42 p. http://californiarangeland.ucdavis.edu/Publications%20pdf/Quick_Start.pdf

Herrick, Jeffrey E., Justin W. Van Zee, Kris M. Havstad, Laura M. Burkett and Walter G. Whitford. 2005. *Monitoring Manual for Grassland, Shrubland and Savannah Ecosystems: Volume 2 – Design, supplementary methods and interpretation*. 206 p. http://californiarangeland.ucdavis.edu/Publications%20pdf/Volume_II.pdf

Hilton, S.; and T.E. Lisle. 1993. *Measuring the fraction of pool volume filled with fine sediment*. Res. Note PSW-RN-414. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture; 11 p. http://www.fs.fed.us/psw/publications/documents/rn-414/rn-414.pdf

Houlahan, J.E., and C.S. Findlay. 2004. Estimating the critical distance at which adjacent land-use degrades wetland water and sediment quality. *Landscape Ecology* 19:677– 690.

Interagency Technical Reference. 1996. *Sampling vegetation attributes*. U.S.D.A., U.S. Forest Service, Natural Resources Conservation Service, and Grazing Land Technology Institute. US Department of the Interior, Bureau of Land Management – National Applied Resource Sciences Center, P.O. Box 25407, Denver, CO 80225-0047. BLM/RS/ST-96/002+1730. 163 p. http://www.blm.gov/nstc/library/pdf/samplveg.pdf.

Jones, B.E., T.H. Rickman, A. Vazquez, Y. Sado and K. W. Tate. 2005. Removal of encroaching conifers to regenerate degraded aspen stands in the Sierra Nevada. *Restoration Ecology* 13: 2.

Kelley, D.W. 1989. The Feasibility of Increasing Fish Populations in Lagunitas Creek by Placing Boulders and Logs in the Creek Channel. Prepared for Marin Resource Conservation District by D. W. Kelley & Associates, New Castle CA 95658. 42 p. www.marinrcd.org

Klein, Randy. 2003. Erosion and Turbidity Monitoring Report Sanctuary Forest Stream Crossing Excavations in the Upper Mattole River Basin, 2002-2003. Prepared for: Sanctuary Forest, Inc., Whitethorn, CA. http://www.bof.fire.ca.gov/board_committees/monitoring_study_group/msg_archived_documents/msg_archived_documents_/rkleinsanctsept2003.pdf

Kocher, S.D. and Harris, R.R. 2005. *Qualitative Monitoring of Fisheries Habitat Restoration*. University of California, Center for Forestry, Berkeley, California. 166 p. http://forestry.berkeley.edu/comp_proj/DFG/Qualitative%20Monitoring%20of%20Fisheries%20Habitat%20Restoration%20Marc.pdf

Kocher, S.D. and R. Harris. 2007. Riparian Vegetation. Forest Stewardship Series 10. Division of Agriculture and Natural Resources Publication 8240. http://anrcatalog.ucdavis.edu/pdf/8240.pdf

Kondolf, G. M. and E.R. Micheli. 1995. Evaluating stream restoration projects. *Environmental Management* 19:1-15.

Kondolf, G. M., S. Anderson, R. Lave, L. Pagano, A. Merenlender and E. S. Bernhardt. 2007. Two decades of river restoration in California: what can we learn? *Restoration Ecology* 15:516–523.

Kreitinger, K. and T. Gardali. 2006. Bringing the Birds Back: A Guide to Habitat Enhancement in Riparian and Oak Woodlands for the North Bay Region. California Partners in Flight Regional Bird Conservation Plan No. 1. http://www.prbo.org/calpif/pdfs/north_bay.pdf

Lennox, M. 2007. Native Tree Response to Riparian Restoration Techniques in Coastal Northern California. Master's Thesis. Sonoma State University, Rohnert Park, California. 54 p. http://cesonoma.ucdavis.edu/files/50162.pdf

Lennox**,** M., D. Lewis, J. Gustafson, K. Tate and E.R. Atwill. 2007. Water Quality Treatment for Livestock Feeding and Exercise Areas on California Coastal Dairy Farms and Ranches. U.C. Division of Agriculture and Natural Resources publication 8014. Davis, California. 9 p. http://anrcatalog.ucdavis.edu/pdf/8210.pdf

Lennox**,** M., D. Lewis, K. Tate, J. Harper, S. Larson and R. Jackson. 2007. *Riparian Revegetation Evaluation on California's North Coast Ranches.* University of California Cooperative Extension. 47 p. http://ucce.ucdavis.edu/files/filelibrary/2161/39706.pdf

Lennox, M.S., D.J. Lewis, R.D. Jackson, J. Harper, S. Larson and K.W. Tate. 2011. Development of Vegetation and Aquatic Habitat in Restored Riparian Sites of California's North Coast Rangelands. *Restoration Ecology* 19: (In Press, doi: 10.1111/j.1526-100X.2009.00558.x) http://cemendocino.ucdavis.edu/files/17544.pdf

Leopold, A. 1949. A Sand County Almanac and Sketches Here and There. Oxford University Press.

Lewis, D.J., K.W. Tate and J.M. Harper. 2000. Sediment Delivery Inventory and Monitoring. Division of Agriculture and Natural Resources publication 8014. Davis, California. 14 p. http://anrcatalog.ucdavis.edu/pdf/8014.pdf

Lewis, D.J., K.W. Tate, J.M. Harper, and J. Price. 2001. Locating sediment sources on California's North Coast rangelands. *California Agriculture* 55(4):32-038. http://ucce.ucdavis.edu/files/repositoryfiles/ca5504p32-68917.pdf

Lewis, D.J., E.R Atwill, M.S. Lennox, L. Hou, B. Karle and K.W. Tate. 2005. Linking On-Farm Dairy Management Practices to Storm-Flow Coliform Loading for California Coastal Watersheds. *Environmental Monitoring and Assessment* 107: 407-425.

Lewis, D., M. Lennox, and S. Nossaman. 2009. Developing a Monitoring Program for Riparian Revegetation Projects. Division of Agriculture and Natural Resources Publication 8363. 16 p. http://anrcatalog.ucdavis.edu/pdf/8363.pdf

Lewis, D.J., E.R. Atwill, M.S. Lennox, M.D.G. Pereira, W.A. Miller, P.A. Conrad, and K.W. Tate. 2010. Reducing Microbial Contamination in Storm Runoff from High Use Areas on California Coastal Dairies. *Water Science & Technology* (In Press, doi: 10.2166/wst.2009.561)

Lewis, D.J., E.R. Atwill, M.S. Lennox, M.D.G. Pereira, W.A. Miller, P.A. Conrad, and K.W. Tate. 2011. Management of Microbial Contamination in Storm Runoff from California Coastal Dairy Pastures. *Journal of Environmental Quality* 39:1782–1789 (In Press, doi:10.2134/jeq2009.0464).

Lisle, T.E. 1987. *Using "residual depths" to monitor pool depths independently of discharge.* Res. Note PSW-394. Berkeley, CA: Pacific Southwest Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture. 4 p. http://www.fs.fed.us/psw/rsl/projects/water/Lisle87.pdf

MacDonald, Lee, Alan W. Smart, and Robert C. Wissmar. 1991. *Monitoring Guidelines to Evaluate Effects of Forestry Activities on Streams in the Pacific Northwest and Alaska*. EPA/910/9-91-001. May 1991.

MRCD (Marin Resource Conservation District). 2004. Initial Study and Mitigated Negative Declaration for Marin Coastal Watershed Permit Coordination Program. Marin Resource Conservation District, Prunuske Chatham Inc., & Sustainable Conservation. Point Reyes Station CA. 85 p. http://www.marinrcd.org/

MRCD (Marin Resource Conservation District). 2009. Tomales Bay Watershed Enhancement Program five-Year Report and Feasibility Study for Program Reauthorization. Marin Resource Conservation District, Point Reyes Station CA.

McDougald, N., B. Frost and D. Dudley. 2003. Photo-Monitoring for Better Land Use Planning and Assessment. U.C. Division of Agriculture and Natural Resources Publication 8067. http://californiarangeland.ucdavis.edu/Publications%20pdf/8067.pdf

Miller, W.A, D.J. Lewis, M. Lennox, M.G.C. Pereira, K.W. Tate, P.A. Conrad, and E.R. Atwill. 2007. Climate and On-Farm Risk Factors Associated with Giardia duodenalis Cysts in Storm Runoff from California Coastal Dairies. *Applied and Environmental Microbiology* 73: 9672-6979.

Miller, W.A, D.J. Lewis, M.D.G. Pereira, M. Lennox, P.A. Conrad, K.W. Tate, and E.R. Atwill. 2008. Farm Factors Associated with Reducing *Cryptosporidium* Loading in Storm Runoff from Dairies. *Journal of Environmental Quality* 37: 1875-1882.

MMWD (Marin Municipal Water District). 2010. Walker Creek Salmon Monitoring Program. Submitted to California Department of Fish and Game Fishery Restoration Grant Program in association with Garcia and Associates. Marin Municipal Water District, Corte Madera CA. http://www.marinwater.org/controller?action=menuclick&id=548

Morrison, M.L., T. Tenant, and T.A. Scott. 1994. Environmental Auditing: Laying the foundation for a comprehensive program of restoration for wildlife habitat in a riparian floodplain. *Environmental Management* 18: 6. pp 939-955.

NMFS (National Marin Fisheries Service). 2001. Guidelines for Salmonid Passage at Stream Crossings. National Oceanic and Atmospheric Administration - National Marine Fisheries Service, Southwest Region. Santa Rosa CA. 14 p. http://www.swr.noaa.gov/hcd/NMFSSCG.PDF

Nossaman, S., M. Lennox, D. Lewis, and P. Olin. 2007. *Quantitative Effectiveness Monitoring of Bank Stabilization and Riparian Vegetation Restoration: A Field Evaluation of Protocols.* University of California Cooperative Extension. 58 p. http://ucce.ucdavis.edu/files/filelibrary/2161/36783.pdf

NPS (National Park Service). 2007. Habitat Assessment of Myrtle's Silverspot Butterfly at Point Reyes National Seashore. Pacific Coast Science and Learning Center Research Project Summary. http://www.nps.gov/pore/parkmgmt/upload/rps_myrtlessilverspot_070816.pdf

NPS (National Park Service). 2010. "Plants out of Place" ID Cards. Target Invasive Plants of Golden Gate National Recreation Area & Point Reyes National Seashore. Weed Watchers Volunteer Program, Fort Cronkhite, Building 1063, Sausalito CA 94965. http://science.nature.nps.gov/im/units/sfan/vital_signs/Invasives/ID_cards.cfm

Opperman, J.J. and A.M. Merenlender. 2004. The effectiveness of riparian restoration for improving instream fish habitat in four hardwood-dominated California streams. *North American Journal of Fisheries Management* 24: 822-834.

Opperman, J.J., K.O. Lohse, C. Brooks, N.M. Kelly and A.M. Merenlender. 2005. Influence of land use on fine sediment in salmonid spawning gravels within the Russian River Basin, California. *Canadian Journal of Fishery Aquatic Science* 62: 2740-2751.

Opperman, J., A. Merenlender, and J. Lewis. 2006. Maintaining Wood in Streams: A Vital Action for Fish Conservation. Division of Agriculture and Natural Resources publication 8157. Davis, California. 11 p. http://anrcatalog.ucdavis.edu/pdf/8157.pdf

Overton, K.C., S.P. Wollrab, B.C. Roberts and M.A. Radko. 1997. R1/R4 (Northern/Intermountain Regions) Fish and Fish Habitat Standard Inventory Procedures Handbook. Gen. Tech. Rep. INT-GTR-346. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 73 p.

Palmer, M.A., E.S. Bernhardt, J. D. Allan, P.S. Lake, G. Alexander, S. Brooks, J. Carr, S. Clayton, C.N. Dahm, J. Follstad Shah, D. L. Galat, S. G. Loss, P. Goodwin, D.D. Hart, B. Hassett, R. Jenkinson, G.M. Kondolf, R. Lave, J.L. Meyer, T.K. O'Donnell, L. Pagano and E. Sudduth. 2005. Standards for ecologically successful river restoration. British Ecological Society, *Journal of Applied Ecology* 42: 208-217.

PCI (Prunuske Chatham, Inc). 2001. *Walker Creek Watershed Enhancement Plan*. Prepared for Marin Resource Conservation District. 55 p.

PCI (Prunuske Chatham, Inc). 2010. *Initial Study and Draft Mitigated Negative Declaration for Marin Coastal Watershed Permit Coordination Program*. Prepared for Marin Resource Conservation District. 99 p.

Pearce, R.A., M.J. Trlica, W.C. Leininger, D.E. Mergen, and G. Frasier. 1998. Sediment movement through riparian vegetation under simulated rainfall and overland flow. *Journal of Range Management* 51: 301-308.

Prunuske, L., M.K. Cordell, S. Holve, and M. Neuman. 1994. *Stemple Creek/ Estero de San Antonia Watershed Enhancement Plan*. Prunuske Chatham, Inc. Sebastopol, California. 175 p.

Ralph, C.J., G.R. Geupel, P. Pyle, T.E. Martin, and D.F. DeSante. 1993. *Handbook of field methods for monitoring landbirds***.** Gen. Tech. Rep. PSW-GTR-144-www. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture. 41 p. http://www.fs.fed.us/psw/publications/documents/gtr-144/

Ralph, C. J., G. R. Geupel, P. Pyle, T. E. Martin, and D. F. DeSante. 1993. Field Methods for Monitoring Landbirds. General Technical Report PBSD-GTR-144. USDA, Albany, CA. http://data.prbo.org/cadc2/index.php?page=songbird-tools

Ralph, C. J., S. Droege, and J. R. Sauer. 1995. Monitoring bird populations by Point Counts. General Technical Report PSW-GTR-149, USDA, Albany, CA. http://data.prbo.org/cadc2/index.php?page=songbird-tools

Reeve, T., J. Lichatowich, W. Towey, and A. Duncan. 2006. Building Science and Accountability into Community-based Restoration: Can a New Funding Approach Facilitate Effective and Accountable Restoration? *Fisheries* 31:1 17-24. http://www.b-e-f.org/watersheds/fisheries.pdf

Reeve, T. and B. Towey. 2007. A Long-term, Monitoring-intensive Approach to Pacific Northwest Watershed Restoration. Ecological Restoration 25: 73-74. http://www.b-e-f.org/watersheds/pdfs/BEF%20-%20Ecological%20Restoration.pdf

Rew L.J., B.D. Maxwell, F.L. Dougher and R. Aspinall. 2006. Searching for a needle in a haystack: evaluating survey methods for non-indigenous plant species. *Biological Invasions* 8: 523-539. http://landresources.montana.edu/rew/publications/rew-2006.pdf

Roni, P. 2005, ed. *Monitoring stream and watershed restoration*. Bethesda, MD, American Fisheries Society. 350 p.

Rosgen, D. 1996. *Applied River Morphology*. Wildland Hydrology, Pagosa Springs, Colorado.

Rosgen, D. 2001. A Practical Method of Computing Streambank Erosion Rate. Proceedings of the Seventh Federal Interagency Sedimentation Conference, Vol. 2, pp. II - 9-15, March 25-29, Reno, NV. http://www.wildlandhydrology.com/assets/Streambank_erosion_paper.pdf

Serpa, L. 2010. Personal communication.

Sheibley, R.W., D.S. Ahearn, and R.A. Dahlgren. 2006. Nitrate loss from a restored floodplain in the lower Cosumnes River, California. *Hydrobiologia* 571:261-272.

Shilling, F., S. Sommarstrom, R. Kattelmann, B. Washburn, J. Florsheim, and R. Henly. 2005. California Watershed Assessment Manual: Volume I. Prepared for the California Resources Agency and the California Bay-Delta Authority. http://cwam.ucdavis.edu

Singer, M.J., Y. Matsuda and J. Blackard. 1982. Effect of Mulch Rate on Soil Loss by Raindrop Splash. *Soil Science Society of America Journal* 45: 107-110.

SFBRWQCB (San Francisco Bay Regional Water Quality Control Board). 2009. Ranch Water Quality Plan Template. Tomales Bay Pathogen TMDL, Grazing Waiver. Oakland, Ca. 22 p. http://www.swrcb.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/tomalesbaypathogenstmdl.shtml

Spaeth, K.E., F.B Pierson, M.A. Weltz, and W.H. Blackburn. 2003. Evaluation of USLE and RUSLE Estimated Soil Loss on Rangeland. *Journal of Range Management* 56: 234-246.

Stockard, W. and R. R. Harris. 2005. Monitoring the Effectiveness of Culvert Fish Passage Restoration. Center for Forestry, University of California, Berkeley. 25 p. http://forestry.berkeley.edu/comp_proj/DFG/Monitoring%20the%20Effectiveness%20of%20Culvert%20Fish%20Passage%20Restora.pdf

Stillwater Sciences. 2008. Lagunitas limiting factors analysis; limiting factors for coho salmon and steelhead. Final report. Prepared by Stillwater Sciences, Berkeley, California for Marin Resource Conservation District, Point Reyes Station, California. 68 p. www.marinrcd.org

STRAW (Students Teachers Restoring A Watershed). 2008. Project Monitoring Form Collaboration. Prepared by Bay Insitute, Prunuske Chatham, U.C. Cooperative Extension and Marin RCD.

SWRCB (State Water Resources Control Board). 2001. The Clean Water Team (CWT) Guidance Compendium for Watershed Monitoring and Assessment. http://www.waterboards.ca.gov/water_issues/programs/swamp/cwt_guidance.shtml

Tate, K.W. 1995a. Streamflow. Rangeland Watershed Program Fact Sheet #38. Division of Agriculture and Natural Resources. http://californiarangeland.ucdavis.edu/Publications%20pdf/FS38.pdf

Tate, K.W. 1995b. Monitoring Streamflow. Rangeland Watershed Program Fact Sheet #39. Division of Agriculture and Natural Resources. http://californiarangeland.ucdavis.edu/Publications%20pdf/FS39.pdf

Tate, K.W., M.D.G. Pereira, and E.R. Atwill. 2004. Efficacy of Vegetated Buffer Strips for Retaining *Cryptosporidium parvum*. *Journal of Environmental Quality* 33: 2243-2251 http://jeq.scijournals.org/cgi/content/abstract/33/6/2243

Tate, K.W., David F. Lile, Donald L. Lancaster, Marni L. Porath, Julie A. Morrison, and Yukako Sado. 2005a. Graphical analysis facilitates evaluation of stream-temperature monitoring data. *California Agriculture* 59: 3. http://repositories.cdlib.org/anrcs/californiaagriculture/v59/n3/p153

Tate, K.W., David F. Lile, Donald L. Lancaster, Marni L. Porath, Julie A. Morrison, and Yukako Sado. 2005b. Statistical analysis of monitoring data aids in prediction of stream temperature. *California Agriculture* 59: 3. http://repositories.cdlib.org/anrcs/californiaagriculture/v59/n3/p161

Tate, K.W., E.R. Atwill, J.W. Bartolome, and G. Nader. 2006. Significant *Escherichia coli* Attenuation by Vegetative Buffers on Annual Grasslands. *Journal of Environmental Quality* 35: 795-805. http://jeq.scijournals.org/cgi/content/abstract/35/3/795

Thayer, G.W., T.A. McTigue, R.J. Salz, D.H. Merkey, F.M. Burrows, and P.F. Gayaldo, (eds.). 2005. *Science-Based Restoration Monitoring of Coastal Habitats, Volume Two: Tools for Monitoring Coastal Habitats*. NOAA Coastal Ocean Program Decision Analysis Series No. 23. NOAA National Centers for Coastal Ocean Science, Silver Springs, MD. 628 p. plus appendices. http://coastalscience.noaa.gov/ecosystems/estuaries/restoration_monitoring.html

Thien, S.J. 1979. A flow diagram for teaching texture by feel analysis. *Journal of Agronomic Education* 8: 54-55. http://soils.usda.gov/education/resources/lessons/texture/

Tiwari, A.K., L.M. Risse, and M.A. Nearing. 2000. Evaluation of WEPP and its Comparison with USLE and RUSLE. *Transactions of the American Society of Agricultural Engineers* 43: 1129-1135.

TBWC (Tomales Bay Watershed Council). 2003. *Tomales Bay Watershed Water Quality Monitoring Plan*. http://www.tomalesbaywatershed.org/waterqualitymonitoring.pdf

Tompkins, M. R. and G. M. Kondolf. 2007. Systematic postproject appraisals to maximize lessons learned from river restoration projects: case study of compound channel restoration projects in northern California. *Restoration Ecology* 15:524–537.

University of California Cooperative Extension. 1995. *The Marin Coastal Watershed Enhancement Project*. University of California Cooperative Extension. Novato, California. 83 p.

USDA. 1997. *National Range and Pasture Handbook*. U.S. Department of Agriculture, Natural Resources Conservation Service Grazing Lands Technology Institute. Washington D.C.

USDA. 1998. Natural Resource Conservation Service Stream Visual Assessment Protocol, NWCC-TN-99-1. Portland, OR: National Water and Climate Center. http://www.wsi.nrcs.usda.gov/products/w2q/water_qual/docs/svapfnl.pdf

USDA. 2005. Stemple CEAP. ftp://ftp-fc.sc.egov.usda.gov/NHQ/nri/ceap/ceapposterstemple.pdf

USDA. 2006. *Integrated Sampling Strategy (ISS) Guide*. U.S. Department of the Interior and U.S.D.A. Forest Service General Tehncial Report RMRS-GTR-164-CD. http://frames.nbii.gov/portal/server.pt?open=512&objID=286&&PageID=490&mode=2&in_hi_userid=2&cached=true

USDA. 2007. National Resources Inventory Handbook of Instructions for Rangeland Field Study Data Collection. National Resource Conservation Service. http://www.ncgc.nrcs.usda.gov/products/nri/range/2007range.html

USDA. 2008a. Environmental Effects of Conservation Practices on Grazing Lands. http://wqic.nal.usda.gov/nal_display/index.php?info_center=7&tax_level=4&tax_subject=595&topic_id=2422&level3_id=6990&level4_id=11307

USDA. 2008b. Effects of Agricultural Conservation Practices on Fish and Wildlife. http://wqic.nal.usda.gov/nal_display/index.php?info_center=7&tax_level=4&tax_subject=595&topic_id=2422&level3_id=6990&level4_id=11306

USDA. 2009. Prescribed Grazing (528) Practice Requirement Sheet and Specification Development Support Tool (528_spec_tool_R5a.xls). Natural Resources Conservation Service, California Technical Note Range 54. Davis, California. 6 p. http://efotg.sc.egov.usda.gov/references/public/CA/TN_CA_Range_54.pdf
spreadsheet: http://efotg.sc.egov.usda.gov/references/public/ca/528_spec_tool_final_R5a.xls

USDA. 2010a. NRCS Conservation Practices: technical standards, specifications, and operations/ maintenance documents available online for Marin County (select the county and go to Section IV-B of the electronic Field Office Technical Guide). http://efotg.nrcs.usda.gov/efotg_locator.aspx?map=CA

USDA. 2010b. NRCS PLANTS Database. http://plants.usda.gov/

USFWS (U.S. Fish and Wildlife Service). 2002. Recovery Plan for the California Red-legged Frog (*Rana aurora draytonii*). U.S. Fish and Wildlife Service, Portland, Oregon. viii + 173 p. http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=D02D

USFWS (U.S. Fish and Wildlife Service). 2005. Revised Guidance on Site Assessments and Field Surveys for the California Red-Legged Frog. U.S. Fish and Wildlife Service, Portland, Oregon. 26 p. http://www.fws.gov/sacramento/es/documents/crf_survey_guidance_aug2005.pdf

Ward, T.A., K.W. Tate, and E.R. Atwill. 2003a. Guidelines for Monitoring the Establishment of Riparian Grazing Systems. Division of Agriculture and Natural Resources publication 8094. Davis, California. 37 p. http://anrcatalog.ucdavis.edu/pdf/8094.pdf

Ward, T.A., K.W. Tate and E.R. Atwill. 2003b. Visual Assessment of Riparian Health. Division of Agriculture and Natural Resources publication 8089. Davis, California. 23 p. http://anrcatalog.ucdavis.edu/pdf/8089LR.pdf

Ward, T.A., K.W. Tate, E.R. Atwill, D.F. Lile, D.L. Lancaster, N.K. McDougald, S. Barry, R.S. Ingram, H.A. George, W.J. Jensen, W.E. Frost, R. Phillips, G.G. Markegard, S. Larson. 2003c. A Comparison of Three Visual Assessments for Riparian and Stream Health. *Journal of Soil and Water Conservation* 58: 83-88.

Weaver, W.W., J.M. Gerstein and R.R. Harris. 2005. *Monitoring the Effectiveness of Upland Restoration*. University of California, Center for Forestry, Berkeley, CA. 100 p. http://forestry.berkeley.edu/comp_proj/DFG/Monitoring%20the%20Effectiveness%20of%20Upland%20Restoration%20March%20200.pdf

Wehren, R., T.J. Barber, E. Engber, and P. Higgins. 2002. Stream restoration techniques evaluation project. Mendocino County Resource Conservation District.

Wei, H., M.A. Nearing, J.J. Stone, D.P. Guertin, K.E. Spaeth, F.B. Pierson, M.H. Nichols, and C.A. Moffet. 2009. A New Splash and Sheet Erosion Equation for Rangelands. *Soil Science Society of America Journal* 73: 1386-1392.

Wildland Solutions. 2008. Monitoring Annual Grassland Residual Dry Matter: A Mulch Manager's Guide for Monitoring Success. (2nd ed.)[Brochure 34 pp.]. Brewster, WA: Guenther, K. and Hayes, G.

Winward, Alma. H. 2000. *Monitoring the Vegetation Resources in Riparian Areas*. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Ogden, Utah. RMRS-GTR-47. 49 pages. http://www.treesearch.fs.fed.us/pubs/5452

APPENDIX A: PROJECT PLANNING & IMPLEMENTATION FORMS

Project Objectives & Targets

Property/ Project Location: _____ Date: _____

Landowner objective (paraphrase concern or reason for doing project):_____

_____

_____

Check any appropriate objectives. 1) Note the priority of each compared to the other objectives selected. 2) Estimate target value if applicable. 3) Decide how long (# of years) until the target is expected to be achieved. Refer to pages 8 – 10 of the RZMP.

Implementation

- ☐ _____ Landowner concern satisfied – _____
  _____ Expected in _____ years
- ☐ _____ Revegetation survival (50 – 100%) – _____
  (for each zone) _____
  _____ Expected in _____ years

Effectiveness

- ☐ _____ Benefit ranch/ farm viability/ productivity:
  - ☐ Improve/ preserve pasture or field production – _____
    _____ Expected in _____ years
  - ☐ Improve livestock management – _____
    _____ Expected in _____ years
  - ☐ Conserve water use – _____
    _____ Expected in _____ years
- ☐ _____ Reduce or prevent sediment delivery (% stable bank, RDM) – _____
  _____ Expected in _____ years
- ☐ _____ Reduce or prevent pathogens/ nutrients (% groundcover, RDM) – _____
  _____ Expected in _____ years
- ☐ _____ Improve or preserve riparian habitat (extent, % tree/shrub/sp cover) – _____
  _____ Expected in _____ years
- ☐ _____ Improve or preserve aquatic habitat (water depth, shade, LWD)– _____
  _____ Expected in _____ years

Validation

- ☐ _____ Increase or preserve terrestrial wildlife abundance/ diversity – _____
  _____ Expected in _____ years
- ☐ _____ Increase or preserve aquatic species abundance/ diversity – _____
  _____ Expected in _____ years
- ☐ _____ Improve or preserve water quantity/ quality – _____
  _____ Expected in _____ years

- ☐ _____ Other:_____
  _____ Expected in _____ years

Monitoring Plan Checklist

Property/ Project Location: _____ Date: _____

Monitoring Form/ Protocol (Location)	Monitoring Plan		Date Completed, Who Completed, & Project Feedback Notes
	Frequency	Summary	
Pre-project:			
☐ Objectives/ Targets (Appx. A)	1x	prioritize objectives and set targets	
Post-project completed for grant reports (2-3 years):			
☐ Map/ Site Sketch (Appx. A)	1x ____	update/ redo project map with location of practices	
☐ Revegetation Data (Appx. A)	1x + ____	more site visits if replanting is needed	
☐ Project Assessment Checklist (Appx. B)	2x + ____	1st & 2nd summer	
☐ Landowner Questionnaire (Appx. B)	1x ____	2nd summer	
☐ Revegetation Survival (Appx. B)	2x ____	1st & 2nd summer (replant if survival < 80%)	
Pre-project, post-project, for grant reports & repeated over time as funding allows:			
☐ Photo-points (Appx. A)	3x ____	locate each on the site map	
☐ Sediment Load Estimates (Appx. C)	2x ____	surveys potential bank/gully & models sheet/rill erosion	
☐ Streambank Stability Line Intercept Transect (Appx. C)	2x ____	stability and vegetation cover along stream (bankful)	
☐ Riparian Line Intercept Transect (Appx. C)	2x ____	vegetation cover along top-of-bank or other direction	
☐ Aquatic Habitat (Appx. C)	1x ____	thalweg transect - pool depth, instream habitat, LWD	
☐ Stream Shade (Appx. C)	1x ____	Densiometer - 3 per site subsection at Tag Lines	
☐ Tag Lines (Weaver et al. 2005 - p. 40)	1x ____	channel width:depth ratio measured in riffles	
☐ Bird Populations (Ralph et al. 1995, 1993)	1x ____	collect data for each subsection of the site	
As needed for certain projects (pre-project, post-project, & repeated):			
☐ Channel Dimensions (Appx. C)	1x ____	x-sections or long. profile to calibrate Tag Lines/ Sediment Loads or Aquatic Habitat	
☐ Maintenance & Event (Weaver et al. 2005 - p. 79)	1x + ____	during road maintenance, estimate eroded volume	
☐ Water Quantity/ Quality (SWRCB 2001, MacDonald et al. 1991)	3x + ____	automated sampling systems preferred	
☐ Fish Passage (Collins 2009, Stockard and Harris 2005, NMFS 2001)	2x ____	qualitative and quantitative protocols used	
☐ Fish Populations (Duffy 2005, Dolloff et al. 1993)	3x + ____	consult partner agencies and local experts	
☐ Freshwater Shrimp (Fong and Vandenberg 1998)	3x + ____	consult partner agencies and local experts	
☐ Red-legged Frog (USFWS 2005, 2002)	3x + ____	consult partner agencies and local experts	

Frequency: the # of visits planned to collect monitoring data over the duration of a typical grant funding riparian restoration for a 3-year contract period. Make changes to represent site plans and needs.

Notes:

Photo-Point Monitoring (STRAW 2008)

Site:_____ Date: _____

Photo Point #: ____ Bearing:_____ Zoom: _____ Coordinate:_____

	Directions to Photo Point Marker:
	Subject Description:
	Comments:

Photo Point #: ____ Bearing:_____ Zoom: _____ Coordinate:_____

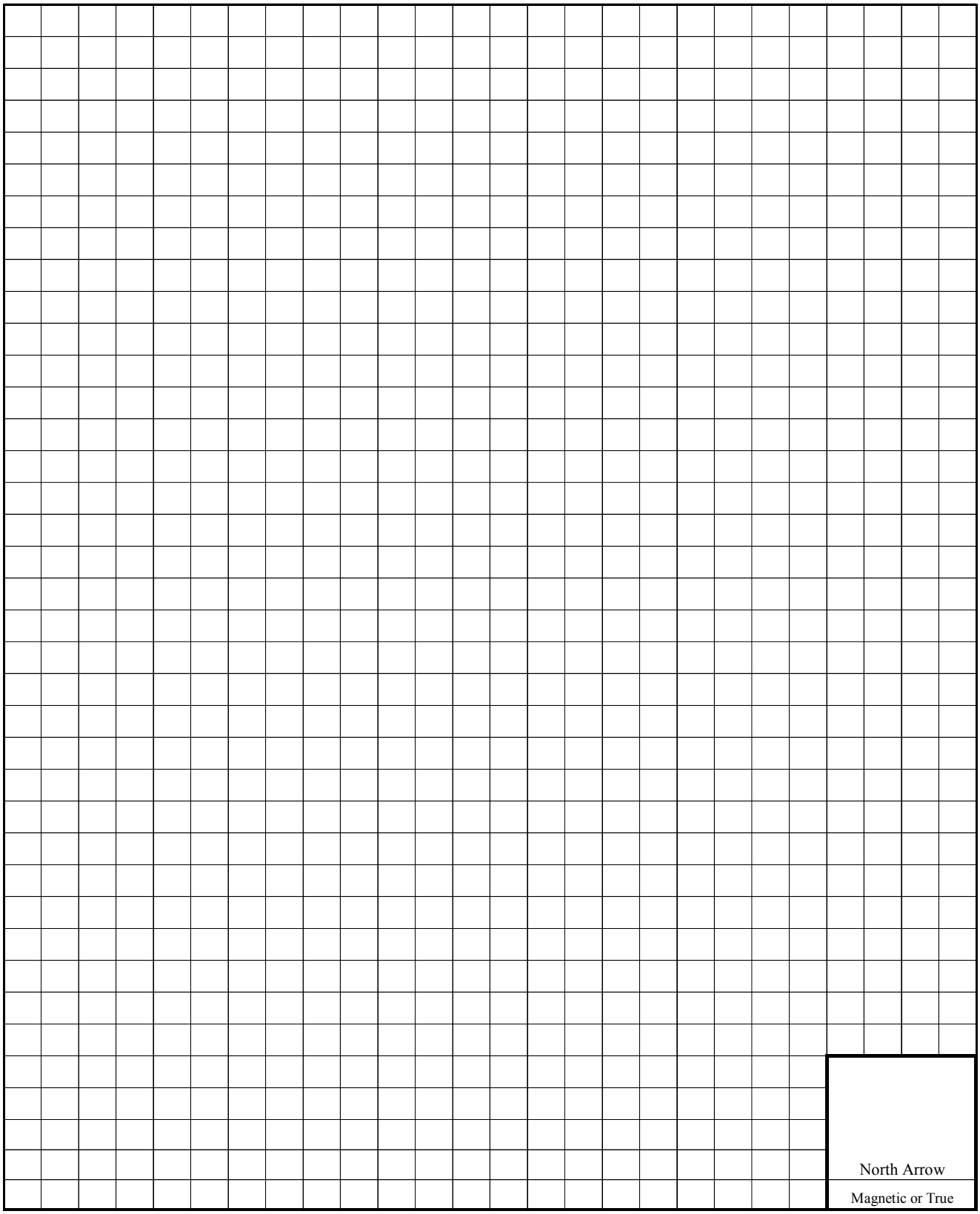
	Directions to Photo Point Marker:
	Subject Description:
	Comments:

Photo Point #: ____ Bearing:_____ Zoom: _____ Coordinate:_____

	Directions to Photo Point Marker:
	Subject Description:
	Comments:

Project Site Sketch (Collins 2009)

Property/ Project Location: _____ Date: _____



Revegetation Data (STRAW 2008)

Site_____ **Funder**_____ **Creek**_____ **Date**_____

Watershed_____ **Width**_____ **Linear Feet**_____

School	Teacher	Students	Grade	Parents

Volunteers

Container Plants

	Brought	Planted	color		Brought	Planted	Color
big leaf maple				Onion grass			
box elder				Oregon ash			
buckeye				red Osier dogwood			
CA rose				Snowberry			
Carex sedge				spicebush			
coffeeberry				thimbleberry			
coyote bush				toyon			
currant				valley oak			
douglas fir				walnut			
dutchman's pipe				wax myrtle			
elderberry				white alder			
grape				CA fescue			
hawthorn				Molate fescue			
hazelnut				western fescue			
honey suckle							
Juncus rush							
live oak							
native black berry							
				TOTAL			

Invasives

Type/ yd^3 Removed

Willows

Groundcover

Seeding SF_____
Blanket SF_____
Mulching SF_____

Biotech

willow wall 1 LF_____
willow wall 2 LF_____
willow wall 3 LF_____
willow wall 4 LF_____

Willow Wattle 1 LF_____
Willow Wattle 2 LF_____
Willow Wattle 3 LF_____
Willow Wattle 4 LF_____

Brush Checkdams_____

Other

Restoration comments:

APPENDIX B: QUALITATIVE MONITORING FORMS

Project Assessment Checklist

Property/Project Location: _____ Project Year: _____

I) **Notify** landowner for permission in advance of site visit.

II) **Take** camera and project folder (with plans, objectives, photos, LA, project history, monitoring, etc.).

III) **Repeat photograph** (relocate photo point as precisely as possible based on original photo and data).

1) Fences	**Yes**	**No**	**N/A**
H-Braces sound			
Wire is tight			
Broken or missing posts			
Evidence of excessive livestock pressure			
Evidence of livestock in enclosure area			
Gates open			
If fence is electrical, is it working			
Electrical fence line clear of vegetation			
Flood gates closed or replaced after winter			

Evaluation completed by:

_____

Date: _____

Effectiveness Rating (see Guide): NA Excellent Good Fair Poor Fail (circle one)

Comments:_____

2) Troughs & Springs	**Yes**	**No**	**N/A**
Does trough have water			
Does the float valve work			
If trough is not working, does the spring have water			
Pipe plugged or broken			
Is there a fence around the spring to keep cows out			
Is there a mud hole at spring of trough			
Is trough poring enough water for the herd			

Effectiveness Rating (see Guide): NA Excellent Good Fair Poor Fail (circle one)

Comments:_____

3) Roads & Animal Trails	**Yes**	**No**	**N/A**
Sheet/rill erosion			
Culverts plugged/smashed/rusted out			
Visible erosion in road/ trail ditch or on fill			
Rolling dips/water bars functioning as planned			
Evidence of short-cut use that causes additional erosion			

Effectiveness Rating (see Guide): NA Excellent Good Fair Poor Fail (circle one)

Comments:_____

4) Plantings & Woody Vegetation	**Yes**	**No**	**N/A**
Evidence of livestock damage			
Evidence of water deficiency			
Water system working			
Weed control adequate			
Wildlife protection working			
Survival of plantings adequate (no replanting?)			
Natural regen. (list tree/ shrub seedlings below)			

Effectiveness Rating (see Guide): NA Excellent Good Fair Poor Fail (circle one)

Riparian Vegetation (see Guide): NA Great Good Fair Poor (circle one)

Comments:_____

5) Grazing & Herbaceous Vegetation (see grazing plan)

	Yes	No	N/A
Is grazing being managed as per grazing plan (see LA)			
Is crossing for livestock stable			

Estimate RDM (lb/ac): NA <200 200-350 350-700 700-1000 1000-1500 >1500

Comments & **list invasive plant species** present (estimate patch size area or % of site for each):

_____

6) Water and Sediment Detention Structures

	Yes	No	N/A
Basin has capacity			
Structures secure			
Evidence of rilling			
Erosion on embankment			
Erosion present at energy dissipating structure			
Other erosion present (if yes, describe below)			

Effectiveness Rating (see Guide): NA Excellent Good Fair Poor Fail (circle one)

Structure Stability (see Guide): NA Great Good Fair Poor (circle one)

Comments: _____

7) Erosion Control Repairs & Structures

	Yes	No	N/A
Toe or footer rocks secure			
Evidence of toe scour			
Weir rock secure			
Has rock moved			
Evidence of piping above weir rock			
Evidence of down cutting upstream of the weir rock			
Evidence of soil piping through or under rock structure			
Is fabric key upstream of the weir rock secure			
Fabric visible			
Evidence of bank erosion or scour around the rock structure			
Upstream and down stream keys holding			
Biotechnical repairs holding			
Other erosion present (if yes, describe below)			

Effectiveness Rating (see Guide): NA Excellent Good Fair Poor Fail (circle one)

Stability (see Guide): NA Great Good Fair Poor (circle one)

Comments: _____

_____

8) Instream Habitat

Estimate instream shelter value (0-3):_____ (see definitions in Guide)

Estimate % site covered by shelter:_____ Calculate instream shelter rating (value X %):_____

Fish passage – 1) upstream jumps < ½ foot tall? Yes No 2) Flow connectivity adequate? Yes No

Comments:_____

9) Overall

	Yes	No	N/A
Is the project being managed per LA			
Remedial action needed			
Inform RCD			
Call landowner			
Inform project designer (NRCS, PCI, etc.)			
Inform contractor (STRAW, etc.)			

Overall Effectiveness Rating (circle one): NA Excellent Good Fair Poor Fail

Comments (determine responsibility, describe action taken, & record dates): _____

_____

Project Assessment Checklist Guide

Effectiveness Rating (Collins 2009)

RATING	OBJECTIVES	TARGETS	UNINTENDED EFFECTS	STRUCTURAL CONDITION
Excellent	Achieved all stated objectives.	Met or exceeded targeted values.	No negative unintended effects. Unintended positive effects may outweigh failure to achieve a target value.	Excellent to Good. Has the intended functional value.
Good	Achieved most stated objectives.	Did not quite meet all targeted values. Or, if no targets were specified, maximum rating is Good.	Nonnegative unintended effects.	Excellent to Fair. Has the intended functional value.
Fair	Partially achieved most objectives, or objectives not achieved were outside the control of practice.	May or may not meet all targeted values.	May have minor unintended negative effects that partially offset objectives.	Excellent to Fair. Has functional value.
Poor	Achieved at least 1 objective – those not achieved were the fault of the practice.	May or may not meet all targeted values.	May have minor or major unintended negative effects that offsets or negates a targeted gain.	Excellent to Poor. Has some functional value.
Fail	Achieved no objectives – practice may be completely gone.	Did not meet targeted values.	May have unintended negative effects that are degrading the habitat and outweigh achieved objectives.	Excellent to Fail. Has no functional value.

Riparian Vegetation (Ward et al. 2003b, Ward et al. 2003c, USDA 1998)

Excellent = 'natural veg' at least 2 active channel widths (native perennials - rush, shrubs, trees, etc. - OR annual grass at intermittent streams) with all age classes of woody species or point bars regenerating

Good = 'natural veg' 1 active channel width – covers floodplain (bare spots common at intermittent streams)

Fair = 'natural veg' ½ active channel width – bare spots common or filtering function slightly compromised

Poor = 'natural veg' < ½ active channel width – bare spots common or lack of regeneration or filtering function severely compromised

Invasive Plants

Refer to species lists provided by the Bay Area Weed Watchers Volunteer Program (NPS 2010) or create one for a specific site using a combination of CW & NW Floristic Provinces (Cal-IPC 2006). Assistance identifying species is available from UC IPM (http://www.ipm.ucdavis.edu/PMG/weeds_intro.html).

Stability (Ward et al. 2003b, Ward et al. 2003c, USDA 1998)

Excellent = banks and channel are stable with outside bends protected by vegetation

Good = moderately stable with infrequent, small areas of erosion – mostly healed over

Fair = moderately unstable with outside bends actively eroding – steep bare soil with high erosion potential

Poor = banks are unstable with active erosion frequent at site

Residual Dry Matter (RDM) (Wildland Solutions 2008)

<200 lb/ac	200-350 lb/ac	350-700 lb/ac
Evidence of total use	Extensive grazing use	Extensive grazing use
<1" tall – "blitzed" or "nuked"	Most 1" tall, some 3-5"	Patchy areas 1"-5" tall
Considerable bare soil apparent	Ground cover sparse, clumpy	Some bare soil patches

700-1000 lb/ac	1000-1500 lb/ac	>1500 lb/ac
Clear signs of grazing use	May have considerable use	May have signs of grazing
Patches of seed stalks	Numerous seed stalks	Dry grass may lay flat
Random bare soil seen at 20'	Bare soil from gophers or trails	Litter may be thick

Instream Shelter (Collins 2009, Flosi et al. 1998)

Value 0: no shelter present

Value 1: 1-5 boulders, bare undercut bank/ bedrock ledge, **OR** a single LWD (>12" dia. & 6' long)

Value 2: 1-2 pieces of LWD associated with any amount of Small WD, 6 or more boulders per 50', stable undercut bank (<12" undercut) with root mass, a single root wad lacking complexity, branches in or near the water, limited submersed vegetative fish cover, **OR** a bubble curtain

Value 3: MUST have a combination of **at least 2** of the following cover types:

- LWD (large woody debris)/ boulders/ root wads,
- 3 or more pieces of LWD combined with SWD,
- 3 or more boulders combined with LWD/ SWD,
- bubble curtain combined with LWD or boulders,
- stable undercut bank with >12" undercut associated with root mass or LWD,
- extensive submerged vegetative fish cover

Fish Passage –*flow connectivity* refers to adequate stream flow between pools for downstream and upstream migration to occur given the annual timing and variability of flow at the site (CDFG 2010, Stockard and Harris 2005, NMFS 2001)

Landowner Questionnaire

Completed by: _____ Date: _____

The intent of this questionnaire is to summarize your thoughts, any confusion you may have had, and unintended side effects resulting from your conservation project in order to reduce future problems and miscommunication. Please answer the following questions using the 1-5 (no-yes) ranks in the box. Thank you again for working with Marin Resource Conservation District.

Rank Descriptions

1 = definitely not, or never
2 = no, or probably not
3 = not sure, or no opinion
4 = yes, or probably so
5 = definitely yes, without a doubt

Landowner/ Manager Interviewed: _____ Project Year: _____

Project Description/ Location: _____

1) Was the project successful meeting your intended goal(s)?

1 **2** **3** **4** **5** **NA**

Comments:_____

_____

2) Could Marin RCD improve any phase in the process (please circle any that apply)?

1 **2** **3** **4** **5** **NA**

Selection Design Construction Maintenance Monitoring Your Time

Other/Comments:_____

_____

3) Was any phase in the process confusing (please circle any that apply)?

1 **2** **3** **4** **5** **NA**

Selection Design Funding Sources Construction Maintenance Monitoring

Other/Comments:_____

_____

4) Will you continue to participate in Marin RCD projects?

1 **2** **3** **4** **5** **NA**

Comments:_____

_____

5) Would you recommend participation in Marin RCD projects?

1 **2** **3** **4** **5** **NA**

Comments:_____

_____

6) Did the project help you conserve or reduce water used for your farm/ ranch?

1 **2** **3** **4** **5** **NA**

Comments:_____

_____

7) Did the project improve your management of a pasture or farm field?

1 **2** **3** **4** **5** **NA**

Comments:_____

_____

8) Did the project help improve the productivity of a pasture or farm field?

1 **2** **3** **4** **5** **NA**

Comments:_____

_____

9) Did the project improve livestock health?

1 **2** **3** **4** **5** **NA**

Comments:_____

_____

10) Have you implemented similar or other conservation practices on your own?

1 **2** **3** **4** **5** **NA**

Describe/Comments:_____

_____

11) Did the project reduce any agricultural expenses (please circle any that apply)?

1 **2** **3** **4** **5** **NA**

Water Feed Electricity Time Fuel Labor

Other/Comments:_____

_____

12) Did the project increase any agricultural expenses (please circle any that apply)?

1 **2** **3** **4** **5** **NA**

Water Feed Electricity Time Fuel Labor

Other/Comments:_____

_____

13) Has the project helped to reduce any stress from natural resource concerns?

1 **2** **3** **4** **5** **NA**

Comments:_____

_____

14) Has the project improved water quality?

1 **2** **3** **4** **5** **NA**

Comments:_____

_____

15) Has the project improved wildlife habitat?

1 **2** **3** **4** **5** **NA**

Comments:_____

_____

Revegetation Survival (STRAW 2008, adapted from Harris 2005)

Page ___ of ___

Site Name_____ **Staff**_____ **Bank / Zone**_____
(Looking Downstream)

Plant Species	# Planted	<3ft - LV	<3ft - HV	>3ft - LV	>3ft - HV

Date Monitored_____

Date(s) Planted_____

Mortality	
Cause (Use Comments)	Percent
_____	_____%
_____	_____%
_____	_____%
_____	_____%
_____	_____%
_____	_____%
	100%

Dominant Weeds and Colonizers

General Notes / Comments

Overall appearance?
Vandalism?
Gophers?
Livestock?
Herbivores?
Girdling?
Watering?
Weeds?
Fencing?
Erosion?
Other?
Wildlife?

LV = Low Vigor (systemic stress)

HV = High Vigor (healthy new growth)

General Browse (Circle One)

None **Low** **High**

Densiometer Data Needed?

YES **NO**

If Yes, use form on back

APPENDIX C: QUANTITATIVE EFFECTIVENESS MONITORING FORMS

Sediment Load Estimates

Property/Project(s) Location: _____ Project Year: _____
Evaluation Completed by: _____ Date: _____

Streambank & Gully Erosion

Locate the erosion sites caused by potential bank failures or channel incision from gullying (Lewis et al. 2000) and record their Length, Width, and Depth (ft) noting the subsection in the site, % deliverable and % fines. Minimum and maximum values are acceptable – use both for the section calculations to produce a range in the site's sediment estimates. Focus on the potential future erosion, but also document recently eroded areas if it occurred since the last survey.

Location (site, section)	Type (bank or gully)	Potential or Eroded	Length	Width	Depth	% Deliv-erable	% Fines

Notes:

Sheet & Rill Erosion

Collect the following field data from each section of the project site to run the Rangeland Hydrology and Erosion Model (RHEM). For any attribute that is too variable for rapid measurement (i.e. % slope and cover), provide minimum and maximum values – input both into the model to produce a range in the final sediment estimates for each section and site. If more subsections are needed, delineate them on a site map or sketch and explain below.

Location (site, section)	Soil Texture	Slope Length	Slope Shape	% Steep-ness	Dominant Plant Growth	Canopy Cover %	Basal Cover %	Rock Cover %	Litter Cover %

Notes:

Sediment Load Estimates Guide

Streambank & Gully Erosion

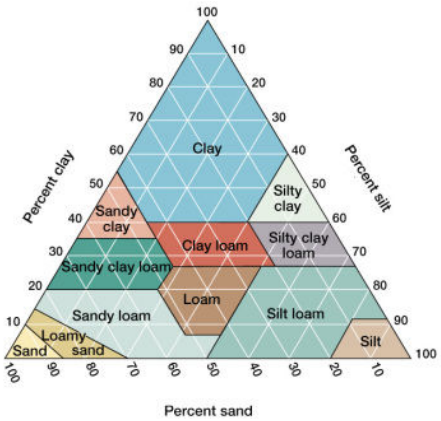
Erosion: the detachment, transport, and deposition of soil particles by wind, raindrops, or water flow
Gully: an erosion channel formed by concentrated surface runoff: larger then 1 ft deep & 1 ft wide
Streambank Erosion: the removal of soil by the direct action of stream flow during high flow
Length: distance parallel to stream of unstable channel
Width: perpendicular to Length measurement up the bank on the slope or of the gullying channel
Depth: perpendicular to Width measurement into the ground
% Deliverable: sediment that is delivered to a watercourse (±30%) of potential erodible volume
% Fines: estimate the proportion of fine sediment (not gravel or cobble) that would erode
Potential Volume: estimated volume of sediment that is potentially deliverable
Eroded Volume: estimated volume of previously eroded sediment from a site

Refer to Lewis et al. (2000) before field work and consult other literature. Enter raw data collected in the field directly into an excel spreadsheet and 1) calculate the total sediment yield volume for each row above including the percent deliverable; 2) sum the potential erodible volume in each section of the site for streambank and gully erosion types separately and divide by 27 to convert to cubic yards (CY); 3) total the potential streambank and gully erosion separately for the site; 4) sum these two for a total estimate of the site; and 5) total sediment saved = preproject potential erodible sediment – postproject eroded sediment – postproject potential erodible sediment.

Sheet & Rill Erosion

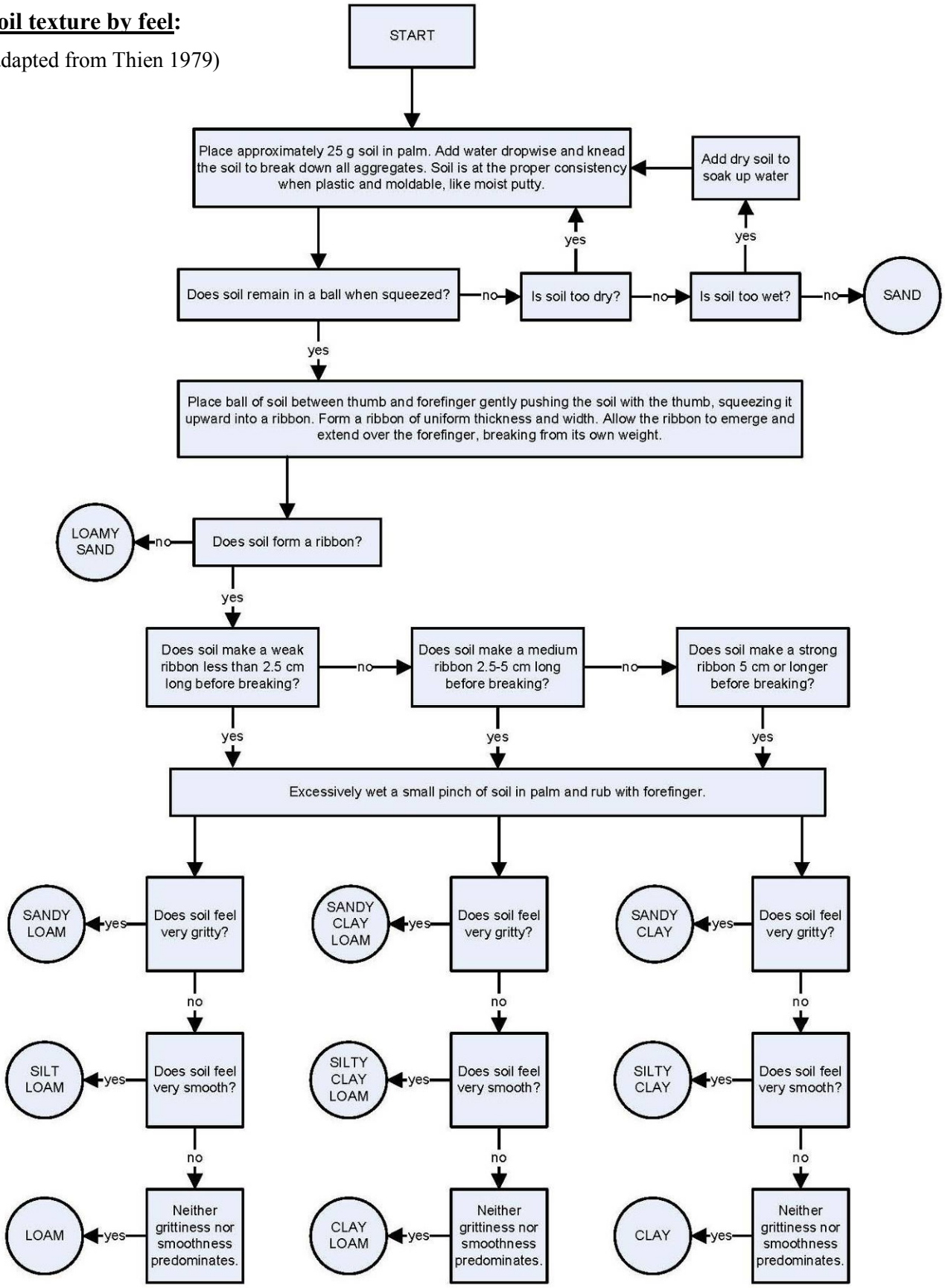
Soil Texture: at < 2"depth, may be Sand, Loamy sand, Sandy loam, Loam, Silt loam, Silt, Sandy clay loam, Clay loam, Silty clay loam, Sandy clay, Silty clay, or Clay (see Marin County Soil Survey or http://casoilresource.lawr.ucdavis.edu/drupal/node/902 to find soil type(s) and use the flow chart on p. 69 at the site to cross-check with expected texture from the table on p. 70-72)
Slope Length: horizontal distance from upper bank (at fence) to waters edge (< 50 meters)
Slope Shape: may be Uniform , Convex , Concave , or S-shaped from upper bank
% Steepness: the percent slope from upper bank to waters edge (rise/run, or clinometer)
Dominant Plant Growth Form: top canopy may be shrubs or perennial grass or annual (='other')
Canopy Cover: % of total vegetation living or dead for woody and herbaceous (USDA 2007)
Basal Plant Canopy Cover: % intersection of plant and soil surface for groundcover layer only
Rock & Litter Cover: % of rocks and litter respectively, for groundcover layer only

After collecting field data, go to http://dss.tucson.ars.ag.gov/rhem/ and enter field data directly into the program. 1) Name each model run (by site and section # within the site) and select English units; 2) select the Kentfield climate station (next closest is Graton); 3) input the field data collected from each section of the project site; 4) record sediment yield and soil loss (tons/ac/yr) for average, 50 year and 100 year storms from each section of the site; 5) multiply by the size of the section (ac) and divide by 1.35 to convert to cubic yards per year; 5) sum all section outputs for totals of the project site; 6) multiply by the number of years since project implementation for both pre and post project surveys; and 7) subtract the post-project value from the pre-project to give total sediment saved.



Soil texture by feel:

(adapted from Thien 1979)



Map Unit #	Map Unit Name	Texture	T Factor (tons/ac/yr)	Erosion Hazard - off road, off trail	Erosion Hazard - road, trail	Range Prod. - normal (lb/ac/yr)	Range Prod. - low (lb/ac/yr)	Range Prod. - high (lb/ac/yr)	Seedling Mortality Potential	Acres	% of County
101	BALLARD GRAVELLY, LOAM 2 TO 9 PERCENT SLOPES	gravelly loam	5	Slight	Moderate	1,700	1,020	2,210	Low	1,768	0.5%
102	BALLARD-URBAN LAND COMPLEX, 0 TO 9 PERCENT SLOPES	gravelly loam	5	Slight	Moderate				Low	856	0.2%
103	BARNABE VERY GRAVELLY LOAM, 30 TO 50 PERCENT SLOPES	very gravelly loam	1	Severe	Severe				Low	821	0.2%
104	BEACHES			Not rated	Not rated				Not rated	1,599	0.4%
105	BLUCHER-COLE COMPLEX, 2 TO 5 PERCENT SLOPES	clay loam	5	Slight	Moderate	1,750	1,050	2,100	High	10,390	2.7%
106	BONNYDOON GRAVELLY LOAM, 15 TO 30 PERCENT SLOPES	gravelly loam	2	Moderate	Severe	2,720	1,870	3,230	Low	516	0.1%
107	BONNYDOON GRAVELLY LOAM, 30 TO 75 PERCENT SLOPES	gravelly loam	2	Very severe	Severe	2,720	1,870	3,230	Low	4,107	1.1%
108	BONNYDOON VARIANT-GILROY-GILROY VARIANT LOAMS, 50 TO 75 PERCENT SLOPES	loam	1	Very severe	Severe	1,535	855	2,035	Low	2,933	0.8%
109	BRESSA VARIANT-MCMULLIN VARIANT COMPLEX, 30 TO 50 PERCENT SLOPES	gravelly loam	3	Severe	Severe				Low	1,510	0.4%
110	CENTISSIMA-BARNABE COMPLEX, 15 TO 30 PERCENT SLOPES	loam	3	Moderate	Severe				Low	785	0.2%
111	CENTISSIMA-BARNABE COMPLEX, 30 TO 50 PERCENT SLOPES	loam	3	Severe	Severe				Low	2,663	0.7%
112	CENTISSIMA-BARNABE COMPLEX, 50 TO 75 PERCENT SLOPES	loam	3	Very severe	Severe				Low	4,851	1.2%
113	CLEAR LAKE CLAY	clay	5	Slight	Slight	1,350	1,215	1,530	High	1,098	0.3%
114	CORTINA GRAVELLY SANDY LOAM, 0 TO 5 PERCENT SLOPES	gravelly sandy loam	4	Slight	Slight	680	340	850	Low	874	0.2%
115	CRONKHITE-BARNABE COMPLEX, 9 TO 15 PERCENT SLOPES	loam	4	Moderate	Severe	1,200	900	1,400	Low	2,261	0.6%
116	CRONKHITE-BARNABE COMPLEX, 15 TO 30 PERCENT SLOPES	loam	4	Moderate	Severe	1,200	900	1,400	Low	2,953	0.8%
117	CRONKHITE-BARNABE COMPLEX, 30 TO 50 PERCENT SLOPES	loam	4	Severe	Severe	960	720	1,120	Low	3,923	1.0%
118	CRONKHITE-BARNABE COMPLEX, 50 TO 75 PERCENT SLOPES	loam	4	Very severe	Severe	960	720	1,120	Low	2,504	0.6%
119	DIPSEA-BARNABE VERY GRAVELLY LOAMS, 30 TO 50 PERCENT SLOPES	very gravelly loam	4	Severe	Severe				Low	2,311	0.6%
120	DIPSEA-BARNABE VERY GRAVELLY LOAMS, 50 TO 75 PERCENT SLOPES	very gravelly loam	4	Very severe	Severe				Low	9,146	2.3%
121	DIPSEA-URBAN LAND-BARNABE COMPLEX, 30 TO 50 PERCENT SLOPES	very gravelly loam	4	Severe	Severe				Low	548	0.1%
122	DUNE LAND			Not rated	Not rated				Not rated	3,552	0.9%
123	FELTON VARIANT-SOULAJULE COMPLEX, 9 TO 15 PERCENT SLOPES	clay loam	3	Moderate	Severe	1,840	1,080	2,080	Low	719	0.2%
124	FELTON VARIANT-SOULAJULE COMPLEX, 15 TO 30 PERCENT SLOPES	clay loam	3	Moderate	Severe	1,840	1,080	2,080	Low	949	0.2%
125	FELTON VARIANT-SOULAJULE COMPLEX, 30 TO 50 PERCENT SLOPES	clay loam	4	Severe	Severe	2,080	1,230	2,360	Low	2,352	0.6%
126	FELTON VARIANT-SOULAJULE COMPLEX, 50 TO 75 PERCENT SLOPES	clay loam	4	Very severe	Severe	2,080	1,230	2,360	Low	1,007	0.3%
127	FLUVENTS, CHANNELED	stratified cobbly sand to silt loam		Slight	Moderate				Not rated	930	0.2%
128	GILROY-GILROY VARIANT-BONNYDOON VARIANT LOAMS, 30 TO 50 PERCENT SLOPES	loam	2	Severe	Severe	1,689	1,005	2,250	Low	3,257	0.8%
129	HENNEKE STONY CLAY LOAM, 15 TO 50 PERCENT SLOPES	stony clay loam	1	Severe	Severe	510	425	680	Low	3,396	0.9%
130	HUMAQUEPTS, SEEPED	peat	5	Slight	Moderate				Not rated	571	0.1%
131	HYDRAQUENTS, SALINE	stratified peat to silt to clay		Slight	Slight				Not rated	2,041	0.5%
132	INVERNESS LOAM, 9 TO 15 PERCENT	loam	4	Slight	Severe				Low	756	0.2%
133	INVERNESS LOAM, 15 TO 30 PERCENT	loam	4	Moderate	Severe				Low	817	0.2%
134	INVERNESS LOAM, 30 TO 50 PERCENT	loam	4	Severe	Severe				Low	638	0.2%
135	INVERNESS LOAM, 50 TO 75 PERCENT SLOPES	loam	4	Very severe	Severe				Low	3,923	1.0%
136	KEHOE LOAM, 9 TO 15 PERCENT SLOPES	loam	3	Moderate	Severe	2,465	2,125	2,975	Low	915	0.2%
137	KEHOE LOAM, 15 TO 50 PERCENT SLOPES	loam	3	Severe	Severe	2,465	2,125	2,975	Low	993	0.3%

Map Unit #	Map Unit Name	Texture	T Factor (tons/ac/yr)	Erosion Hazard - off road, off trail	Erosion Hazard - road, trail	Range Prod. - normal (lb/ac/yr)	Range Prod. - low (lb/ac/yr)	Range Prod. - high (lb/ac/yr)	Seedling Mortality Potential	Acres	% of County
138	KEHOE VARIANT COARSE SANDY LOAM, 9 TO 15 PERCENT SLOPES	coarse sandy loam	4	Slight	Severe	2,975	2,210	3,400	Low	489	0.1%
139	KEHOE VARIANT COARSE SANDY LOAM, 15 TO 50 PERCENT SLOPES	coarse sandy loam	4	Moderate	Severe	2,975	1,768	3,081	Low	2,712	0.7%
140	LOS OSOS-BONNYDOON COMPLEX, 5 TO 15 PERCENT SLOPES	gravelly loam	3	Moderate	Severe	2,626	1,691	2,948	Low	2,722	0.7%
141	LOS OSOS-BONNYDOON COMPLEX, 15 TO 30 PERCENT SLOPES	gravelly loam	3	Moderate	Severe	2,515	1,640	2,860	Low	5,972	1.5%
142	LOS OSOS-BONNYDOON COMPLEX, 30 TO 50 PERCENT SLOPES	gravelly loam	3	Severe	Severe	2,440			Low	13,688	3.5%
143	LOS OSOS-URBAN LAND-BONNYDOON COMPLEX, 15 TO 30 PERCENT SLOPES	gravelly loam		Moderate	Severe				Low	652	0.2%
144	LOS OSOS-URBAN LAND-BONNYDOON COMPLEX, 30 TO 50 PERCENT SLOPES	gravelly loam	3	Severe	Severe		571	1,857	Low	535	0.1%
145	MAYMEN-MAYMEN VARIANT GRAVELLY LOAMS, 30 TO 75 PERCENT SLOPES	gravelly loam	1	Very severe	Severe	1,714	537	1,253	Low	7,119	1.8%
146	MONTARA CLAY LOAM, 15 TO 30 PERCENT SLOPES	clay loam	1	Moderate	Severe	805			High	273	0.1%
147	NOVATO CLAY	clay	5	Slight	Slight		1,530	2,550	High	3,113	0.8%
148	OLOMPALI LOAM, 2 TO 9 PERCENT SLOPES	loam	3	Slight	Moderate	2,125	1,530	2,550	High	1,232	0.3%
149	OLOMPALI LOAM, 9 TO 15 PERCENT SLOPES	loam	3	Moderate	Severe	2,125	1,545	2,576	High	3,357	0.9%
150	OLOMPALI LOAM, 15 TO 30 PERCENT SLOPES	loam	3	Moderate	Severe	2,146	1,212	1,818	Low	1,921	0.5%
151	PABLO-BAYVIEW COMPLEX, 15 TO 50 PERCENT SLOPES	loam	1	Moderate	Severe	1,556	1,212	1,818	Low	3,080	0.8%
152	PABLO-BAYVIEW COMPLEX, 50 TO 75 PERCENT SLOPES	loam	1	Very severe	Severe	1,556			Low	2,978	0.8%
153	PALOMARIN-WITTENBERG COMPLEX, 9 TO 15 PERCENT SLOPES	loam	3	Slight	Severe				Low	585	0.1%
154	PALOMARIN-WITTENBERG COMPLEX, 15 TO 30 PERCENT SLOPES	loam	3	Moderate	Severe				Low	2,345	0.6%
155	PALOMARIN-WITTENBERG COMPLEX, 30 TO 50 PERCENT SLOPES	loam	3	Severe	Severe				Low	3,004	0.8%
156	PALOMARIN-WITTENBERG COMPLEX, 50 TO 75 PERCENT SLOPES	loam	3	Very severe	Severe				Not rated	7,742	2.0%
157	PITS, QUARRIES			Not rated	Not rated		900	1,800	High	342	0.1%
158	REYES CLAY	clay	5	Slight	Slight	1,350			Not rated	7,967	2.0%
159	ROCK OUTCROP-XERORTHENTS COMPLEX, 50 TO 75 PERCENT SLOPES			Not rated	Not rated		2,273	3,636	High	1,792	0.5%
160	RODEO CLAY LOAM, 2 TO 15 PERCENT SLOPES	clay loam	5	Slight	Severe	2,727	1,660	3,140	Low	3,808	1.0%
161	SAURIN-BONNYDOON COMPLEX, 2 TO 15 PERCENT SLOPES	clay loam	3	Slight	Severe	2,460	1,553	2,915	Low	995	0.3%
162	SAURIN-BONNYDOON COMPLEX, 15 TO 30 PERCENT SLOPES	clay loam	3	Moderate	Severe	2,298	1,918	3,592	Low	2,719	0.7%
163	SAURIN-BONNYDOON COMPLEX, 30 TO 50 PERCENT SLOPES	clay loam	3	Severe	Severe	2,837	1,918	3,592	Low	5,878	1.5%
164	SAURIN-BONNYDOON COMPLEX, 50 TO 75 PERCENT SLOPES	clay loam	3	Very severe	Severe	2,837			Low	4,769	1.2%
165	SAURIN-URBAN LAND-BONNYDOON COMPLEX, 15 TO 30 PERCENT SLOPES	clay loam		Moderate	Severe				Low	605	0.2%
166	SAURIN-URBAN LAND-BONNYDOON COMPLEX, 30 TO 50 PERCENT SLOPES	clay loam		Severe	Severe				Low	1,364	0.3%
167	SHERIDAN VARIANT COARSE SANDY LOAM, 9 TO 30 PERCENT SLOPES	coarse sandy loam	3	Moderate	Severe				Low	1,245	0.3%
168	SHERIDAN VARIANT COARSE SANDY LOAM, 30 TO 50 PERCENT SLOPES	coarse sandy loam	3	Severe	Severe				Low	1,261	0.3%
169	SHERIDAN VARIANT COARSE SANDY LOAM, 50 TO 75 PERCENT SLOPES	coarse sandy loam	3	Very severe	Severe		1,653	2,480	Low	1,378	0.4%
170	SIRDRAK SAND, 2 TO 15 PERCENT SLOPES	sand	5	Slight	Moderate	2,204	1,636	2,455	Low	2,106	0.5%
171	SIRDRAK SAND, 15 TO 50 PERCENT SLOPES	sand	5	Moderate	Severe	2,182	1,800	2,520	High	575	0.1%
172	SIRDRAK VARIANT SAND, 0 TO 5 PERCENT SLOPES	sand	4	Slight	Slight	2,160	1,561	2,602	Low	1,710	0.4%
173	SOBEGA LOAM, 9 TO 15 PERCENT SLOPES	loam	3	Slight	Severe	2,168	1,561	2,602	Low	2,344	0.6%
174	SOBEGA LOAM, 15 TO 30 PERCENT SLOPES	loam	3	Moderate	Severe	2,168	680	1,763	Low	503	0.1%

Map Unit #	Map Unit Name	Texture	T Factor (tons/ac/yr)	Erosion Hazard - off road, off trail	Erosion Hazard - road, trail	Range Prod. - normal (lb/ac/yr)	Range Prod. - low (lb/ac/yr)	Range Prod. - high (lb/ac/yr)	Seedling Mortality Potential	Acres	% of County
175	TAMALPAIS-BARNABE VARIANT VERY GRAVELLY LOAMS, 15 TO 30 PERCENT SLOPES	very gravelly loam	2	Moderate	Severe	1,330	600	1,547	Low	537	0.1%
176	TAMALPAIS-BARNABE VARIANT VERY GRAVELLY LOAMS, 30 TO 50 PERCENT SLOPES	very gravelly loam	2	Severe	Severe	1,168	629	1,608	Low	2,061	0.5%
177	TAMALPAIS-BARNABE VARIANT VERY GRAVELLY LOAMS, 50 TO 75 PERCENT SLOPES	very gravelly loam	2	Very severe	Severe	1,216			Low	1,783	0.5%
178	TOCALOMA-MCMULLIN COMPLEX, 15 TO 30 PERCENT SLOPES	gravelly loam	3	Moderate	Severe				Low	349	0.1%
179	TOCALOMA-MCMULLIN COMPLEX, 30 TO 50 PERCENT SLOPES	gravelly loam	3	Severe	Severe				Low	7,773	2.0%
180	TOCALOMA-MCMULLIN COMPLEX, 50 TO 75 SLOPES	gravelly loam	3	Very severe	Severe				Low	22,878	5.9%
181	TOCALOMA-MCMULLIN-URBAN LAND COMPLEX, 15 TO 30 PERCENT SLOPES	gravelly loam		Moderate	Severe				Low	1,184	0.3%
182	TOCALOMA-MCMULLIN-URBAN LAND COMPLEX, 30 TO 50 PERCENT SLOPES	gravelly loam	3	Severe	Severe		706	1,412	Low	5,095	1.3%
183	TOCALOMA-SAURIN ASSOCIATION, STEEP	clay loam	3	Moderate	Severe	1,059	625	1,250	Low	919	0.2%
184	TOCALOMA-SAURIN ASSOCIATION, VERY STEEP	clay loam	3	Severe	Severe	938	645	1,290	Low	17,623	4.5%
185	TOCALOMA-SAURIN ASSOCIATION, EXTREMELY STEEP	clay loam	3	Very severe	Severe	968	1,771	2,656	Low	23,496	6.0%
186	TOMALES FINE SANDY LOAM, 2 TO 9 PERCENT SLOPES	fine sandy loam	4	Slight	Moderate	2,214	1,771	2,656	Low	1,499	0.4%
187	TOMALES FINE SANDY LOAM, 9 TO 15 PERCENT SLOPES	fine sandy loam	4	Slight	Severe	2,214	1,753	2,629	Low	2,531	0.6%
188	TOMALES FINE SANDY LOAM, 15 TO 30 PERCENT SLOPES	fine sandy loam	4	Moderate	Severe	2,191	1,735	2,602	Low	1,067	0.3%
189	TOMALES FINE SANDY LOAM, 30 TO 50 PERCENT SLOPES	fine sandy loam	4	Severe	Severe	2,168	1,717	2,576	Low	2,559	0.7%
190	TOMALES LOAM, 2 TO 9 PERCENT SLOPES	loam	4	Slight	Moderate	2,146	1,717	2,576	Low	591	0.2%
191	TOMALES LOAM, 9 TO 15 PERCENT SLOPES	loam	4	Slight	Severe	2,146	1,789	2,684	Low	4,967	1.3%
192	TOMALES LOAM, 15 TO 30 PERCENT SLOPES	loam	4	Moderate	Severe	2,237	1,717	2,576	Low	4,633	1.2%
193	TOMALES LOAM, 30 TO 50 PERCENT SLOPES	loam	4	Severe	Severe	2,146	1,711	2,667	Low	2,570	0.7%
194	TOMALES-SOBEGA LOAMS, 15 TO 30 PERCENT SLOPES	loam	4	Moderate	Severe	2,222	1,656	2,581	Low	39	0.0%
195	TOMALES-SOBEGA COMPLEX, 9 TO 15 PERCENT SLOPES	fine sandy loam	4	Slight	Severe	2,151	1,621	2,526	Low	840	0.2%
196	TOMALES-SOBEGA COMPLEX, 15 TO 30 PERCENT SLOPES	fine sandy loam	4	Moderate	Severe	2,105	1,692	2,637	Low	1,297	0.3%
197	TOMALES-STEINBECK FINE SANDY LOAMS, 30 TO 50 PERCENT SLOPES	fine sandy loam	4	Severe	Severe	2,198	1,750	2,727	Low	639	0.2%
198	TOMALES-STEINBECK LOAMS, 5 TO 15 PERCENT SLOPES	loam	4	Slight	Severe	2,273	1,674	2,609	Low	6,743	1.7%
199	TOMALES-STEINBECK LOAMS, 15 TO 30 PERCENT SLOPES	loam	4	Moderate	Severe	2,174	1,674	2,609	Low	1,957	0.5%
200	TOMALES-STEINBECK LOAMS, 30 TO 50 PERCENT SLOPES	loam	4	Severe	Severe	2,174			Not rated	320	0.1%
201	URBAN LAND-BALLARD COMPLEX, 0 TO 9 PERCENT SLOPES	gravelly loam		Not rated	Not rated				Not rated	1,023	0.3%
202	URBAN LAND-XERORTHENTS COMPLEX, 0 TO 9 PERCENT SLOPES			Not rated	Not rated				Not rated	2,816	0.7%
203	XERORTHENTS, FILL			Not rated	Not rated				Not rated	2,658	0.7%
204	XERORTHENTS-URBAN LAND COMPLEX, 0 TO 9 PERCENT SLOPES			Not rated	Not rated		1,052	2,892	Low	11,549	3.0%
205	YORKVILLE CLAY LOAM, 9 TO 15 PERCENT SLOPES	clay loam	4	Slight	Severe	2,454	1,052	2,892	Low	351	0.1%
206	YORKVILLE CLAY LOAM, 15 TO 30 PERCENT SLOPES	clay loam	4	Moderate	Severe	2,454	1,020	2,805	Low	1,083	0.3%
207	YORKVILLE CLAY LOAM, 30 TO 50 PERCENT SLOPES	clay loam	4	Severe	Severe	2,380	791	2,176	Low	5,442	1.4%
208	YORKVILLE-ROCK OUTCROP COMPLEX, 9 TO 15 PERCENT SLOPES	clay loam	4	Slight	Severe	1,846	774	2,129	Low	589	0.2%
209	YORKVILLE-ROCK OUTCROP COMPLEX, 15 TO 30 PERCENT SLOPES	clay loam	4	Moderate	Severe	1,806			Not rated	1,841	0.5%
210	WATER			Not rated	Not rated				Not rated	57,297	14.7%
211	DAMS			Not rated	Not rated					2	0.0%

Streambank Stability Line Intercept Transect (Gerstein and Harris 2005) Page ___ of ___

Contract #:_____ Contract Name:_____ Implementation Mo/Yr:_____
Site Name:_____ Stream/Drainage:_____
Evaluators:_____ Date:_____Project Feature #/Name:_____ Transect #:_____
Transect Length:_____ Start Point:_____

Streambank: (*Left* or *Right*) **Direction:** (*Upstream* or *Downstream*) **Project Phase:** (*Pre-treatment* or *Post-treatment*)

Bank Class			0-3' Height Class			3-15' Height Class			>15' Height Class			Comments
Start Distance	End Distance	Stability Class	Start Distance	End Distance	Species	Start Distance	End Distance	Species	Start Distance	End Distance	Species	(location, bearing, other plant species,)

Species Codes

				BRRS = Barren Soil
				ALLV = Gravel, sand, fines
				ROCK = Boulder, cobble, concrete
				LITT = Leaf litter
				HERB = Herbaceous
				ROOT = Woody roots
				LWD = Wood > 12"dia (SWD<12")
				REST = Restoration Structure
				OTST = Other Structure

Bank Stability Codes

STNT = stable bank, no treatment STPT = stable, treatment area UNPT = unstable, treatment area UNNT = Unstable bank, no treatment

LB = Left Bank, **RB** = Right Bank, **UPS** = Upstream, **DNS** = Downstream, ‖ = Parallel, ⊥ = Perpendicular
AF = annual forbs, **AG** = annual grass, **AFG** = annual forbs and grass, **PG** = perennial grass, **PF** = perennial forb

Additional Comments:

Riparian Line Intercept Transect (Harris et al. 2005)

Page ___ of ___

Contract #:_____ Contract Name:_____ Implementation Mo/Yr:_____
Site Name:_____ Stream/Drainage:_____
Evaluators:_____ Date:_____ Project Feature #/Name:_____ Method #:____
Transect #:_____ Length:_____ Start Point:_____

Streambank: (*Left* or *Right*) **Direction:** (*Upstream* or *Downstream*) **Project Phase:** (*Pre-treatment* or *Post-treatment*)

0-3' Height Class			3-15' Height Class			>15' Height Class			Comments
Start	End	Species	Start	End	Species	Start	End	Species	(location & bearing of transect, total # transects, other plant species observed)
Distance			Distance			Distance			

Species Codes

			BRRS = Barren Soil
			ALLV = Gravel, sand, fines
			ROCK = Boulder, cobble, concrete
			LITT = Leaf litter
			HERB = Herbaceous
			ROOT = Woody roots
			LWD = Wood > 12"dia (SWD<12")
			REST = Restoration Structure
			OTST = Other Structure

LB = Left Bank, **RB** = Right Bank, **UPS** = Upstream, **DNS** = Downstream, ‖ = Parallel, ⊥ = Perpendicular
AF = annual forbs, **AG** = annual grass, **AFG** = annual forbs and grass, **PG** = perennial grass, **PF** = perennial forb

Additional Comments:

Aquatic Habitat (adapted from Gerstein 2005)

Page _____ of _____

Site:_____Contract Name/#:_____Crew:_____

Stream:_____Drainage:_____Date:_____

All Habitat Units	**Habitat Unit #**										
	Habitat Unit Type										
	Main or **S**ide channel										
	End Distance										
	Max Depth of Water										
	Width @ 1/3										
	Width @ 2/3										
	% Slackwater (winter only)										
Pool/ Flatwater	Shelter Value										
	% Unit Covered										
	1st element										
	% of total 1										
	2nd element										
	% of total 2										
Pools	Pool Former (element)										
	Origin of Former (natural or structure)										
	Depth of Tail Crest										
Restoration Structure Data	**Habitat Unit #**										
	Structure #										
	Structure Type										
	Structure Condition										
	Structure Problem										
	Upstream End Distance										
	Max Depth of Water										
	Shelter (% of unit covered by structure)										
	Slackwater (% created by structure in winter)										
Debris	**LWD #**										
	SWD #										
	Aggregate WD #										
Comments:											

Cover Elements	Code
Aquatic Veg	AV
Bedrock Ledge	BE
Boulder	BO
Bubble Curtain	BC
LWD (> 12”)	LW
Root Mass	RM
SWD (< 12”)	SW
Terrestrial Veg	TV
Undercut Bank	UB

Pool Former	Code
Bedrock	BE
Boulder	BO
Lateral Scour	LS
Live Tree	LT
LWD	LW
Multiple	MU
Rootwad	RW
Unknown	UN

Level III Habitat Types	Code
Main Channel Pool	MP
Scour Pool	SP
Backwater Pool	BP
Flatwater	FW
Riffle	RF
Cascade	CA
Dry	DR

Stream Shade (Harris et al. 2005)

Page _____ of _____

Contract #:_____ Contract Name:_____ Implementation Mo/Yr:_____
Site Name:_____ Stream/Drainage:_____
Evaluators:_____ Date:_____ Project Phase: (*Pre-treatment* or *Post-treatment*)
Project Feature #/Name:____ Start Point:_____

Point #	Stream Distance	Canopy Density (17 total points)				Percent		Comments (Note tree composition, project feature, or planting zone)
		DNST	Right	UPST	Left	Deciduous	Evergreen	
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

Water Temperature, Point: 1_____ 10 _____ 20 _____ 30 _____
Air Temperature, Point: 1_____ 10 _____ 20 _____ 30 _____

Additional Comments:

Channel Dimensions (Gerstein 2005, Gerstein and Harris 2005) Page _____ of _____

Contract #: **Contract Name:** **Implementation Mo/Yr:**

Site Name: **Stream/Drainage:**

Date: **Phase:** (*Pre-treatment* or *Post-treatment*) **Project Feature #/Name:** **XS #:**

Crew: **Level** **Stadia Rod** **Recorder**

Description of Survey (include BM & XP locations)**:**

Total Survey Length (ft & tenths)**:**

Station	**(+) BS**	**HI**	**(-) FS**	**Elevation**	**Comments** (record geomorphic features, substrate, veg. and other factors of interest at each station)

Codes: BM = Benchmark, **HI** = Height of Instrument, **FS** = Foresight, **BS** = Backsight, **XP** = Cross Section Endpoint, **LB** = Left Bank, **RB** = Right Bank, **UPS** = Upstream, **DNS** = Downstream, **FP** = Floodplain, **LT/MT/HT** = Low/Middle/High Terrace, **LEW/REW** = Left/Right Edge Water, **BKF** = Bankfull, **PB** = Point Bar, **TP** = Turning Point, ‖ = Parallel, ⊥ = Perpendicular

Additional Comments:

Appendix 2: Project-specific CEQA Compliance Checklist

Marin Resource Conservation District

Project-specific CEQA Compliance Checklist

Project Name: _____ Landowner: _____

Project Location: _____

Watershed / Subwatershed: _____

Year Identified: _____ Year Completed:_____

Purpose: _____

_____

_____

	Steps	Verification Standard *(attach documentation where appropriate)*	Verified	
			Date	Initials
Qualification	Project Area	Project occurs within PCP boundaries and ***not in***: • The waters of Estero de San Antonio and Estero Americano. • Tidally influenced wetlands and waters. • Vernal pools. • Dune habitat. • Serpentine grasslands.		
	Project Actions	Project can be implemented using program practices. (See Mitigated Negative Declaration, Table 1.) *Practices to be used:*		
	Project Size	Proposed project fits within practice size limits. (See Mitigated Negative Declaration, Table 2.) *Approximate dimensions:*		
	Sensitive Resources	Project is not likely to adversely affect sensitive biological or cultural resources.		
	Projects that meet above criteria can qualify for the program. The purpose of the following steps is to ensure project selection, planning, implementation, and monitoring comply with CEQA requirements and Program Description in the PCP.			

	Steps	Verification Standard *(attach documentation where appropriate)*	Verified	
			Date	Initials
Selection	Project Objectives	Objectives statement includes agreed-upon landowner objectives, anticipated environmental benefits of the project, and RZMP Appendix A "Project Objectives and Targets."		
	Pre-selection Site Evaluation *(Items with a positive response generate a planning/design note to ensure avoidance of sensitive resources)*	Project will / will not occur on Unique Farmland or Farmland of Statewide Importance.		
		Historical resources, if any, on the property are / are not near project activities.		
		Known archaeological resources do / do not occur near project activities.		
		Sacred sites could / could not be affected by project activities.		
		The project area does / does not have potential for special-status species.		
		The project does / does not occur in critical habitat		
	Selection Criteria	Project selection information form is complete.		
	Public Notice	Provide public notice of projects under consideration at the upcoming RCD Board meeting before final selection.		
Planning	Background Scoping	Resource reports or summary memo: • Biological resources. • Cultural resources. Recommendations are included in project-specific impact avoidance measures.		
	Project-specific Impact Avoidance Measures	Project-specific impact avoidance measures, based upon "Conditions to Avoid or Minimize Adverse Impacts" in the IS/MND, issues identified in project selection, and conditions generated by resource-specific reports, supplied to project designers and planners and included in construction contract.		
	Monitoring Plan	Monitoring plan based upon project goals and site conditions. (Decide whether to include in 25% of projects to collect quantitative and validation data for program evaluation.) *See RZMP page 14 and Monitoring Plan Checklist included in RZMP Appendix A.*		
	Landowner Agreement	Landowner agreement includes statement of objectives, permit compliance responsibilities, and monitoring plan.		
	Early regulator contact	Specific permit needs identified and project included on appropriate lists for early regulator consultation. Following site visits, if any, include any additional resource protection into project-specific avoidance measures.		

	Steps	Verification Standard *(attach documentation where appropriate)*	Verified	
			Date	Initials
Implementation	Pre-project Monitoring	Baseline data for monitoring characteristics, including photo-monitoring as described in RZMP pages 15-16. *Use the "Photo-Point Monitoring" form in RZMP Appendix A.*		
	Permit Conditions Summary	Permit conditions summary contains all permit conditions and avoidance measures generated during project selection and planning. Summary is included in construction contract documents.		
	Preconstruction Biological Survey	Project area has had a preconstruction survey, if needed based upon biological resources report, and appropriate hazard fencing is installed.		
	Preconstruction Training	Construction crew has been trained on sensitive resources that may occur in the project area and measures to avoid impacts. They have protocols for actions in case of inadvertent discoveries.		
	Implementation Monitoring	Immediate post-project monitoring to verify successful implementation, as required from the monitoring plan in developed in project planning.		

Required Post-Construction Reports

Report	Due

Appendix 3: Applicable U.S. Army Corps of Engineers Nationwide Permits

The content of all of the Nationwide Permits (NWPs) is available on the U.S. Army Corps of Engineers San Francisco District website: http://www.spn.usace.army.mil/regulatory/nwp.html#nwplist.

The Marin Coastal Permit Coordination Program uses:

NWP 13 (Bank Stabilization)

NWP 27 (Aquatic Habitat Restoration, Establishment, and Enhancement Activities)

NWP 33 (Temporary Construction, Access, and Dewatering).

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF TRANSPORTATION
111 GRAND AVENUE
P. O. BOX 23660
OAKLAND, CA 94623-0660
PHONE (510) 622-5491
FAX (510) 286-5559
TTY 711

MARIN RCD
OCT 18 2010
Received

Flex your power!
Be energy efficient!

October 13, 2010

MRN000057
SCH # 2004052008

Ms. Nancy Scolari
Marin Resource Conservation District
P.O. Box 1146
Point Reyes Station, CA 94956

Dear Ms. Scolari:

Marin Coastal Watersheds Permit Coordination Program – Initial Study and Draft Mitigated Negative Declaration (MND)

Thank you for continuing to include the California Department of Transportation (Department) in the environmental review process for the project referenced above. We have reviewed the project documents and have the following comments to offer.

Encroachment Permit
Please be advised that any work or traffic control that encroaches on State right-of-way (ROW) requires an encroachment permit issued by the Department. Further information is available on the following website: http://www.dot.ca.gov/hq/traffops/developserv/permits/

To apply, a completed encroachment permit application, environmental documentation, and five (5) sets of plans clearly indicating State ROW must be submitted to the address below. Traffic-related mitigation measures should be incorporated into the construction plans during the encroachment permit process.

Office of Permits
California DOT, District 4
P.O. Box 23660
Oakland, CA 94623-0660

Should you require further information or have any questions regarding this letter, please contact Connery Cepeda of my staff at (510) 286-5535.

Sincerely,

Becky Frank for

LISA CARBONI
District Branch Chief
Local Development – Intergovernmental Review

c: Scott Morgan (State Clearinghouse)

State of California – The Natural Resources Agency **ARNOLD SCHWARZENEGGER**, *Governor*
DEPARTMENT OF FISH AND GAME **John McCamman**, *Director*
Bay Delta Region
7329 Silverado Trail
Napa, CA 94558
(707) 944-5500
www.dfg.ca.gov

MARIN RCD
NOV 8
Received

November 3, 2010

Ms. Nancy Scolari
Marin Resource Conservation District
Post Office Box 1146
Point Reyes Station, CA 94956

Dear Ms. Scolari:

Subject: Marin Coastal Watershed Permit Coordination Program, Mitigated Negative Declaration, SCH #2004052008, Marin County

The Department of Fish and Game (DFG) has reviewed the Mitigated Negative Declaration (MND) provided for the subject project, and we have the following comments.

Lake and Streambed Alteration Agreements
For any activity that will divert or obstruct the natural flow, or change the bed, channel, or bank (which may include associated riparian resources) of a river or stream, or use material from a streambed, DFG may require a Lake and Streambed Alteration Agreement (LSAA), pursuant to Section 1600 et seq. of the Fish and Game Code, with the applicant.

The MND states that regulatory agencies will "issue permits to the Marin RCD covering projects on private lands and on public lands leased to private entities and to PRNS [Point Reyes National Seashore] for work on national park lands" and that landowners will implement projects under supervision of the Marin RCD. The MND also describes the program as providing "one-stop shopping" for permitting. A list of permits addressed by the Permit Coordination Program includes Lake and Streambed Alteration Agreements issued by DFG.

DFG issues LSAAs to entities who are conducting activities in a stream area. For DFG to issue LSAAs to Marin RCD for the Permit Coordination Program, the Marin RCD will need to be directly responsible for conducting each activity, including control over any sub-contractors and others implementing the projects. We recommend the Marin RCD should work with DFG to develop the Permit Coordination Program in a way that provides standard LSAA notification content and assists DFG for LSAA compliance review. Alternatively, DFG can provide LSAAs directly to responsible landowners as part of the Permit Coordination Program.

Please note that PRNS, as a branch of the federal government, is exempt from the requirement to notify DFG for streambed alterations. This exemption may not apply to other entities on federal lands.

California Endangered Species Act
Please be advised that a California Endangered Species Act (CESA) Permit must be obtained if the project has the potential to result in take of species of plants or animals listed under CESA, either during construction or over the life of the project.

The MND describes activities which may be conducted in areas where species listed under CESA may be present and taken by project activities. The MND also describes practices intended to protect listed species. While we recognize that these described practices may be beneficial, they are insufficient to ensure that take of listed species and other adverse effects to listed species will be avoided. The practice descriptions are also insufficient to ensure that program activities will be conducted in conformance with CESA. DFG recommends that the MND include specific information regarding the type and location of activities which may result in take of species listed under CESA and that the MND, to the extent possible, incorporate measures that are sufficient to ensure that take of CESA-listed species is clearly avoided. DFG also recommends that the MND be revised to state that activities with the potential to result in take of species of plants or animals listed under CESA will only be conducted under a valid CESA permit issued by DFG to the landowner or entity implementing the project.

If you have any questions, please contact Mr. Richard Fitzgerald, Coastal Habitat Conservation Supervisor, at (707) 944-5568 or rfitzgerald@dfg.ca.gov.

Sincerely,

Scott Wilson
Acting Regional Manager
Bay Delta Region

cc: State Clearinghouse

Kathie Lowrie
Prunuske Chatham, Inc.
Kathie@pcz.com